FLOWERS

Economical Design of Overhanging Steel Roof Trusses

Architectural Engineering

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ECONOMICAL DESIGN OF OVERHANGING STEEL ROOF TRUSSES

BY

ROY W. FLOWERS

THESIS

For the Degree of Bachelor of Science
in Architectural Engineering

COLLEGE OF ENGINEERING
UNIVERSITY OF ILLINOIS

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Roy Warner Flowers

ENTITLED Economical Design of Overhanging Steel Roof Trusses

IS APPROVED BY ME AS FULFILLING THIS PART OF THE REQUIREMENTS FOR THE DEGREE

OF Bachelor of Science in Architectural Engineering

N. Clifford Ricker

HEAD OF DEPARTMENT OF Architecture

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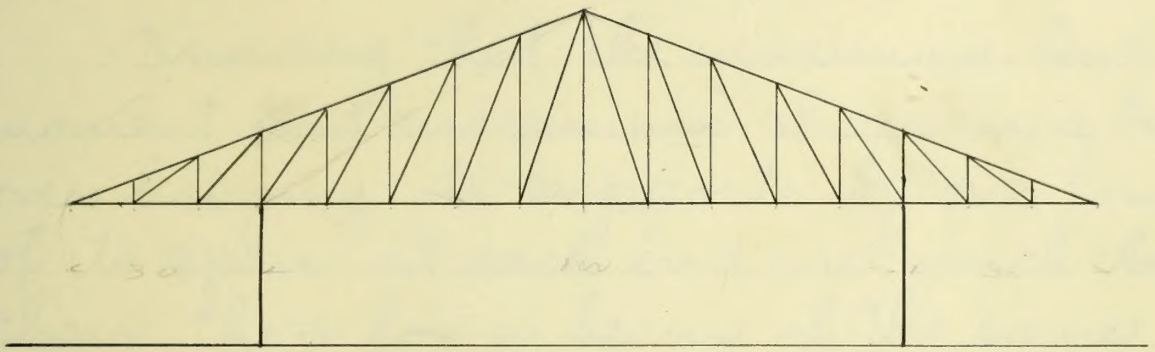
Economical Design of Overhanging Steel Roof Trusses.

Type of Truss



Span of truss 160'-0"
rise 30'-0"
spacing on centres 20'-0"

Economical points of support; 30'-0" from each end.

Weight of truss, in pounds per square foot of area covered, when supported as above — 4.27

Weight of truss, in pounds per square foot of area covered, when supported at ends — 8.46

Weight, in pounds per square foot of area covered, saved by supporting truss as above rather than at ends 4.19 pounds; the area covered is the same in both cases.

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In designing medium or long span roof trusses the usual practice is to use a pin-connected truss or one having curved chords in preference to a simple roof truss.

Knowing that the maximum bending moment and maximum shear in a beam over-hanging its supports by one fourth of its span at each end are much less than those for a beam of the same length supported at the ends, it was assumed that the same would be true of a truss and that this would be lighter for a given total length, if it were supported at two intermediate panel points about one-fourth of its total length from each end, than if it were supported at the extreme ends.

Roof trusses of this type have been used in a few cases and they might become more common, if their values were understood. For rail road trainsheds or for ware houses in warm countries where protection from the sun and rain

is needed for fruits or grain, such trusses could be used with great advantage, since in many cases the outer walls might be entirely ommitted; the trusses being then supported on two rows of columns anchored to their foundations.

Method of Procedure.

A truss of 160 feet total length of the type shown, on first page, was first studied. Its rise and the spacing of trusses on centres were taken, from known data, as being probably most economical at 30 feet rise and 20 feet spacing on centres.

The members of all trusses were constructed of two angles set back to back of the longer legs, with a half inch gusset plate between them, except in a few cases where the long web members in compression required angles reinforced by cover plates or web plates.

The following loads were assumed Tin with long leaf pine sheathing 6#

per square foot.

Snow per square foot of horizontal projection 20#.

Wind per square foot of vertical projection 30#. Reduced by the formula for inclined surfaces

$$P = \frac{2}{3} i$$

P= normal wind pressure in pounds per square foot of inclined surface for 30# on a vertical plane.

i = angle of inclination of the roof surface with a horizontal.

The weight of the trusses was computed by U. C. Ricker's formula

$P = \frac{s}{25} + \frac{s^2}{6000}$ = weight of truss in pounds per square foot of horizontal area covered.

s= the span in feet.

The maximum loading was assumed to act with the snow on the entire roof surface and with the wind pressure on one side, together with the total weight of the truss and roof system.

Steel Work.

The safe resistance of steel was assumed as follows:—

Tension 7.5 tons per square inch.
Compression reduced by Ketchum's formula for struts and columns (Ketchum's "Steel Mill Buildings")

$$P = 8.0 - .42\frac{L}{r}$$

P = safe load in tons per square inch
L = unsupported length of member in feet
r = radius of gyration of section in inches.

The curves on sheets #1, 2, 3, 4, 5 were plotted from the above formula, and these give readily the safe working strengths for the four sizes of angles as shown; these sizes were adopted as being better suited for truss members than any other sizes or sections.

Resistances of shop driven rivets were taken as follows:—

Shear 5 tons per square inch.
Bearing 7.5 tons per square inch.

These values being rather low and the resistance of power driven field rivets being but 10 per cent less,

all rivets were considered as shop driven

The curves on sheet #6 give the number of $\frac{3}{4}$" inch rivets required for single and double shear and for bearing on the various thicknesses of the angles and plates used.

For comparison with the truss of 160 feet span supported at the different panel points, truss of equal spans supported at the ends, with the same spacing and the same inclination of top chord were designed.

To verify the results obtained for the 160 feet span, a second truss of 100 feet span was studied when supported at the different panel points of the lower chord.

The curves on sheet #7 shows the relative economy of these trusses by giving the weights in pounds per square foot of horizontal area covered.

The designing of the roof system will be fully explained and will

show clearly the method used.

The roof covering is of tin laid on $\frac{7}{8}$ inch long leaf pine sheathing.

The steel rafters are supported by steel purlins at each panel point of the upper chord.

The loads in pounds per square foot of roof surface were taken as follows:—

Tin and sheathing	6#
Snow load	18.7#
Wind pressure normal to roof	13.7#

Rafters

The spacing of the rafters was first determined in the following manner.

The sheathing was considered as extending over but one space, as with short pieces, to be entirely safe.

The vertical loads per square foot of roof surface are tin 2#, sheathing 4# and snow 18.7#, total 24.7#

The normal component of this load is $24.7^{\#} \cos i = 24.7^{\#} \times .936 = 23.1^{\#}$

The normal wind pressure is 13.7#

making a maximum normal load of 36.8# per square foot.

The rafters must not be spaced farther apart than the safe length of the sheathing found by applying formulas for breaking and bending; the smaller spacing given by these formulas was taken as the safe distance between rafters.

The formulas are:

1. Breaking $L = \sqrt{\frac{5600t^2}{3W}}$
2. Bending $L = \sqrt[3]{\frac{6800t^3}{3W}}$

L = the safe spacing of rafters on centres in feet.

t = the thickness of the sheathing

W = the normal load in pounds per square foot of surface supported by the rafter

Applying the formulas

1. Breaking $L = \sqrt{\frac{5600 \times (\frac{7}{8})^2}{3 \times 36.8}} = 6.28$ feet.
2. Bending $L = \sqrt[3]{\frac{6800 \times (\frac{7}{8})^3}{3 \times 36.8}} = 3.45$ feet.

The distance for bending being smaller the rafters were spaced 3 feet, 3 inches (3.25 feet) to secure even spacing between trusses.

Design of Rafters.

Weight of rafters assumed at 2# per square foot of roof surface

The vertical load per square foot of roof surface will then be $24.7^{\#} + 2^{\#} = 26.7^{\#}$

Since this load acts vertically and the rafters lie in an inclined surface the components parallel and normal to the roof surface and the rafter must therefore be used in the design.

The angle of inclination of the roof surface $i = 20°-33'$

$\sin i = .351$ $\cos i = .936$

Parallel component

$26.7^{\#} \times .351 = 9.4^{\#}$

Normal component

$26.7^{\#} \times .936 = 25.0^{\#}$

Normal wind pressure $13.7^{\#}$

Maximum normal load $38.7^{\#}$

The length of the rafters will be the same as the length of one panel of the top chord of the truss. = 10.69 feet.

The formulas for the section modulus and moment of inertia

of the section for the steel rafters are

1. Section modulus $= \frac{I}{c} = \frac{WL^2c}{128000}$
2. Moment of inertia $= I = \frac{WL^3c}{448000}$

W = weight normal to roof surface in pounds per square foot.
L = length of the rafter in feet
c = spacing of rafters on centres in inches.

Applying these formulas

1. $\frac{I}{c} = \frac{WL^2c}{128000} = \frac{38.7 \times (10.69)^2 \times 39}{128000} = 1.35$
2. $I = \frac{WL^3c}{448000} = \frac{38.7 \times (10.69)^3 \times 39}{448000} = 4.10$

From Carnegie

a 4" - $7\frac{1}{2}$# I beam. $\frac{I}{c} = 3.0$ $I = 6.0$
a 4" - $6\frac{1}{4}$# [. $\frac{I}{c} = 2.1$ $I = 4.2$

The channel section being lightest was used for the rafters.

The component, of the loads acting on the rafter, parallel to the roof surface must be considered.

This component produces a longitudinal compression in the rafter and it increases from zero at the upper end of the rafter to a maximum at the lower end. The intensity of the stress at the middle

will be one half of the maximum.

The parallel component of the loads is 9.4# per square foot.

The total parallel load on one rafter is then

$$9.4^{\#} \times 10.69 \times 3.25 = 326^{\#}$$

One half of this = 163# and acts at the middle of the length of the rafter.

The area of a 4"-6¼# [is 1.84 square inches; the uniform compression per square inch due to this longitudinal compression is $\frac{163}{1.84} = 89.0^{\#} = .0445$ tons.

Let Δ = the deflection of the rafter in inches

W = the load in tons

L = the length of the rafter in feet

c = the spacing of rafters on centres in ins.

Then $\Delta = \frac{3WL^4c}{44800000} = \frac{3 \times .0445 \times (10.69)^4 \times 39}{44800000} = .015$

If P' = actual unit stress in tons.

P = compression at middle of rafter in tons per square inch.

Δ = deflection of rafter in inches.

e = distance from neutral axis of section to most remote fibre in inches.

$P' = P\left(1 + \frac{3\Delta}{e}\right) = .082\left(1 + \frac{3 \times .015}{2}\right) = .084$ T's

The safe value of F in the formula for breaking now is 8.000-.084= 7.916 Ts

And $\frac{I}{c} = \frac{WL^2 6}{16000 \times F} = \frac{38.7 \times (10.69)^2 \times 39}{16000 \times 7.916} = 1.36$

$I = \frac{WL^3 c}{56000 F} = \frac{38.7 \times (10.69)^3 \times 39}{56000 \times 7.916} = 4.15$

The 4"- $6\frac{1}{4}$# I satisfies these new conditions and will therefore be used for the rafters.

Design of Purlins.

Area of one panel supported by one purlin 20 x 10.69 = 213.8 square feet.

The vertical component of the load per square foot is tin 2#, sheathing 4#, rafter 1.9#, snow 18.7#, a maximum load of 26.6# per square foot.

Total load in tons on one purlin

$\frac{26.6 \times 213.8}{2000} = 2.84$

The parallel component of load on one purlin is 2.84 sin i = 2.84 X .351 = 1.00 ton.

The normal component of the load on one purlin is 2.84 cos i = 2.84 X .936 = 2.66 tons.

The normal wind load is $\frac{213.8 \times 1.37}{2000} =$ 1.46 tons.

The total normal load is then 4.12 T's
The section modulus and moment of inertia are:—

$$\frac{I}{c} = \frac{3WL}{16} = \frac{3 \times 4.12 \times 20}{16} = 15.5$$

$$I = \frac{3WL^2}{56} = \frac{3 \times 4.12 \times (20)^2}{56} = 88.4$$

From Carnegie

A 9"-25# I beam $\frac{I}{c} = 20.4, I = 91.9$

Weight of the purlin

$20 \times 25^{\#} = 500^{\#} = .25$ T's

Normal component is $.25 \times .936 = .23$ T's

The maximum normal load is

$4.12 + .23 = 4.25$ T's

Then $\frac{I}{c} = \frac{3WL}{16} = \frac{3 \times 4.25 \times 20}{16} = 15.9$

$$I = \frac{3WL^2}{56} = \frac{3 \times 4.25 \times (20)^2}{56} = 91.1$$

The 9"-25# I beam satisfies these requirements and will be safe so far as the normal load is considered.

Considering the parallel component of the loads $1.00\,T + .25 \times .351 = 1.088$ T's

The required section modulus and moment of inertia are;—

$$\frac{I}{c} = \frac{3WL}{16} = \frac{3 \times 1.088 \times 20}{16} = 4.1$$

$$I = \frac{3WL^2}{56} = \frac{3 \times 1.088 \times (20)^2}{56} = 23.3$$

The sidewise values of a 9"-25# I beam are $\frac{I}{c} = 2.54$ and $I = 5.65$

The required values are much greater than the values of the purlin assumed showing that the size must be greatly increased, or that suspension rods must be used. The latter being much lighter and a cheaper construction will be employed. They will be placed at the centre of the panels and must be large enough to carry a load equal to the parallel component of the loads on one half the panel or .5 tons. Each rod must carry .5 tons plus the load supported by the rod in the panel next lower than the one in question.

By using this construction the length of the purlin will be reduced by one half as well as the load.

$L = 10$ feet and $W = .50$ tons

Then $\frac{I}{c} = \frac{3WL}{16} = \frac{3 \times .50 \times 10}{16} = .94$

$I = \frac{3WL^2}{56} = \frac{3 \times .50 \times (10)^2}{56} = 2.68$

The 9"-25# I beam may be safely used as a purlin if the rods are attached at the centre of the purlin.

The ridge purlin need be designed

for but half as much wind load as the other purlins but the suspension rods cause a concentrated load at the centre of the purlin equal to the sum of the loads supported by the rods.

To design the ridge purlin, apply the formulas for uniform and concentrated loads separately, then add the two respective values of $\frac{I}{c}$ and I to determine the required section of purlin.

The permanent and snow loads are the same as before 2.66 tons (See design of purlin)

The normal wind load will be

$$\frac{10.69}{2} \times 20 \times 13.7^{\#} = 1464^{\#} = .732 \text{ T's}$$

The maximum normal load is

$$2.66 + .73 = 3.39 \text{ T's}$$

The section modulus and moment of inertia are:-

$$\frac{I}{c} = \frac{3WL}{16} = \frac{3 \times 3.39 \times 20}{16} = 12.7$$

$$I = \frac{3WL^2}{56} = \frac{3 \times 3.39 \times 20^2}{56} = 72.5$$

One suspension rod supports a load of .5 tons and weighs on an average 30 pounds.

There are 16 panels with rods so the total stress will be $16(.5T + \frac{38^{\#}}{2000}) = 8.24T$'s

The vertical component will be

$8.24 \sin i = 8.24 \times .351 = 2.89$ T's

$\frac{M}{S} = \frac{I}{c}$ but $M = \frac{WL}{4}$ and $S = 8$ T's

$\frac{I}{c} = \frac{\frac{WL}{4}}{8} = \frac{WL}{32} = \frac{2.89 \times 20}{32} = 1.9$

$I = 1.9 \times 4.5 = 8.6$

For concentrated and uniform loads the total values are:

$\frac{I}{c}$ $12.7 + 1.9 = 14.6$

I $72.5 + 8.6 = 81.1$

A 9"-21# I beam $\frac{I}{c} = 18.9$, $I = 84.9$ satisfies these requirements and will be used for the ridge purlin.

Weight of purlin is $20 \times 21^{\#} = 420^{\#} = .21$ T's adding this to W and substituting in the formulas again

Uniform. $\frac{I}{c} = \frac{3WL}{16} = \frac{3 \times 3.60 \times 20}{16} = 13.5$

$I = \frac{3WL^2}{56} = \frac{3 \times 3.60 \times 20^2}{56} = 77.1$

Total values for uniform and concentrated loads are:—

$\frac{I}{c} = 13.5 + 1.9 = 15.4$

$I = 77.1 + 8.6 = 85.7$

This new value of I is larger than the value for a 9"-21# I beam so a 9"-25# I beam $\frac{I}{c} = 20.4$, $I = 91.9$ must

be used for the ridge purlin.

The suspension rods must have sufficient tensile strength to resist the stress caused by the parallel component, of the load on the purlin, equal to .5 tons

All rods must have upset ends and nuts turned tightly against the webs of the beams through which they pass; the rods in the two lower panels will be $\frac{1}{2}$ inch in diameter, $\frac{5}{8}$ inch in the next two panels, $\frac{3}{4}$ inch in the next two panels and $\frac{7}{8}$ inch in the two upper panels.

Truss loads at each panel point.

Permanent load

Tin (2#) on $\frac{7}{8}$ inch long leaf pine sheathing (4#) per square foot

$20 \times 10.69 \times 6^{\#} = 1283^{\#}$

6 rafters $6\frac{1}{4}^{\#}$ each 10.69 feet long = $400^{\#}$

1 purlin $25^{\#}$ — 20 feet long = $500^{\#}$

1 suspension rod $3.0^{\#}$ per foot = $30^{\#}$

Truss, by Ricker's formula 10.67 pounds per square foot of area covered

$20 \times 10 \times 10.67 = 2134^{\#}$

Total permanent load = 4347

Snow load per panel

$18.7 \times 10.69 \times 20 = 4000$

Total vertical load is

$4000 + 4347 = 8347^{\#} = 4.17 Ts$

Normal wind load

$13.7 \times 10.69 \times 20 = 2920^{\#} = 1.46 Ts$

The stresses were found by means of the usual stress diagrams The sheets show the maximum stresses, the size, lengths and weights of members, both actual and centre line, weight of truss and of details and the weight in pounds of truss and roof in pounds per square foot of horizontal area covered.

Curve sheet # 8 compares the weight in pounds per square foot of horizontal area covered of the trusses supported at the ends as designed and the weights of like spans as computed by Ricker's formula $\frac{s}{25} + \frac{s^2}{5000} = w$ and Merriman and Jacoby's formulas for steel trusses $\frac{3}{4}(3 + \frac{1}{10}s)$ and for wood trusses $\frac{1}{2}(s + \frac{1}{10}s)$.

Conclusions.

It is easily seen from the curves on sheet # 7 that the trusses supported at intermediate panel points of the lower chord are lighter, in pounds per square foot of horizontal area covered, than the trusses supported at the ends, and that the most economical points of support are about $\frac{1}{5}$ to $\frac{1}{4}$ of the length of the truss from each end. It may also be seen that an overhanging truss can be built lighter and therefore cheaper, considering the area covered, than a smaller truss with the same inclination of top chord and same spacing. Thus a truss of 160 feet length with the supports 30 feet from each end is a slight per square foot of area covered as a truss of 100 feet span supported at the ends.

When the points of support of the trusses are moved farther from the ends there is a tension on one of the columns, caused by the effect

of the wind load. As the points of supports are placed still nearer each other, the wind stresses in the long diagonal web members become excessive and this requires very large and heavy members to resist the compression.

From the comparative curves on sheet # 8 it is evident that the formula given by Merriman and Jacoby for the weight of steel roof trusses gives results much too high and that the values given by Rickes's formula are from 5 to 15 per cent high, increasing with the span. Merriman's and Jacoby's formula for wood trusses compares favorably with the weights for steel trusses found, but study and comparison with the weights of actual wood trusses show that the formula gives weights that are too small.

From these results it appears that steel trusses can be constructed lighter than wood trusses

and that the formula generally used for determining the weight of trusses usually give excessive values of the weight of trusses.

Ricker's formula was deduced for wood trusses with steel vertical rods and it should be reduced about 15 per cent for steel trusses

While designing these trusses a careful study of the most economical sections for members of trusses shows that the angles of the sizes $3\frac{1}{2}$" x $2\frac{1}{2}$", $3\frac{1}{2}$" x 3", 5" x $3\frac{1}{2}$" and 6" x 4" are preferable, with due consideration for the lightest sections and the greatest safe strength at the same time.

The smaller angles were generally used as tension members, but when the number of rivets required was so small that a gusset plate of moderate size could be used, requiring only one row of rivets in the truss members, these sections were employed for the shorter compression members also.

The larger sections both receive two rows of rivets in the longer leg, and hence the gusset plates were often made smaller by using two rows of rivets in the truss members. When the longer members of the trusses were in compression and required greater resistance than could be obtained by using two angles, cover plates or web plates were added with advantage.

SPAN 160'-0" RISE 30'-0" DISTANCE BETWEEN TRUSSES 20'-0" DISTANCE BETWEEN SUPPORTS 160'-0"

Member	Permanent and Snow Load Stress	Maximum Wind Load Stress	Maximum Stress	Section	Weight Per Foot of Length	Centre Line Length	Centre Line Weight	Corrected Maximum Stress	Corrected Section	Weight Per Foot of Length	Actual Length	Actual Weight of Member
B-1	+85.60	+20.76	+106.36	2 ∠ 6X6X 3/4	57.4	10.69	612.0	+105.16	2 ∠ 6X6X 3/4	57.4	11.02	632.0
C-2	+85.60	+21.21	+106.81	"	"	"	612.0	+105.61	"	"	10.69	612.0
D-4	+79.80	+19.61	+99.41	"	"	"	612.0	+98.21	"	"	"	612.0
E-6	+74.10	+18.01	+92.11	"	"	"	612.0	+91.01	"	"	"	612.0
F-8	+68.50	+16.30	+84.80	2 ∠ 6X6X 5/8	48.4	"	516.0	+83.75	2 ∠ 6X6X 5/8	48.4	"	516.0
G-10	+62.60	+14.63	+77.23	"	"	"	516.0	+76.33	"	"	"	516.0
H-12	+56.80	+12.90	+69.70	2 ∠ 6X6X 1/2	39.2	"	418.0	+68.85	2 ∠ 6X6X 1/2	39.2	"	418.0
I-14	+51.00	+11.14	+62.14	"	"	"	418.0	+61.34	"	"	"	418.0
X-1	-80.00	-22.16	-102.16	2 ∠ 6X6X 5/8	48.4	10.00	484.0	-100.96	2 ∠ 6X6X 5/8	48.4	9.58	463.0
X-3	-74.60	-20.11	-94.71	"	"	"	484.0	-93.61	"	"	10.00	484.0
X-5	-69.40	-18.02	-87.42	"	"	"	484.0	-86.32	"	"	"	484.0
X-7	-64.10	-15.94	-80.04	"	"	"	484.0	-79.09	"	"	"	484.0
X-9	-58.70	-13.83	-72.53	2 ∠ 6X6X 1/2	39.2	"	392.0	-71.68	2 ∠ 6X6X 1/2	39.2	"	392.0
X-11	-53.20	-11.72	-64.92	"	"	"	392.0	-64.17	"	"	"	392.0
X-13	-47.80	-9.61	-57.41	2 ∠ 6X6X 3/8	29.8	"	298.0	-56.66	2 ∠ 6X6X 3/8	298	"	298.0
X-15	-42.50	-7.30	-49.80	"	"	"	298.0	-49.20	"	"	"	298.0
1-2	+ 4.00	+1.50	+ 5.50	1∠ 3 1/2 X2 1/2 X 5/16	6.1	3.75	22.9	+ 5.44	1∠ 3 1/2 X2 1/2 X 5/16	6.1	3.17	19.3
2-3	- 6.80	-2.54	- 9.34	"	6.1	12.50	76.2	- 9.24	"	"	10.58	64.6
3-4	+ 5.92	+2.34	+ 8.26	2∠ 3 1/2 X2 1/2 X 5/16	12.2	7.50	91.5	+8.17	2∠ 3 1/2 X2 1/2 X 5/16	12.2	6.92	84.5
4-5	- 8.00	- 3.11	- 11.11	1∠ 3 1/2 X2 1/2 X 5/16	6.1	15.00	91.5	-10.99	1∠ 3 1/2 X2 1/2 X 5/16	6.1	13.87	84.5
5-6	+ 7.92	+3.11	+11.03	2∠ 3 1/2 X2 1/2 X 5/16	12.2	11.25	137.2	+10.91	2∠ 3 1/2 X2 1/2 X 5/16	12.2	10.67	130.0
6-7	- 9.60	- 3.78	-13.38	"	"	18.00	219.8	-13.23	"	"	16.92	206.3
7-8	+10.00	+ 3.93	+13.93	2∠ 5X 3 1/2 X 3/8	20.8	15.00	311.8	+13.78	2∠ 5X 3 1/2 X 3/8	20.8	13.92	290.0
8-9	-11.48	- 4.45	-15.93	2∠ 3 1/2 X2 1/2 X 5/16	12.2	22.10	270.0	-15.75	2∠ 3 1/2 X2 1/2 X 5/16	12.2	21.27	259.6
9-10	+11.96	+ 4.69	+16.65	2∠ 5X 3 1/2 X 3/8	20.8	18.75	389.5	+16.47	2∠ 5X 3 1/2 X 3/8	20.8	17.08	355.0
10-11	-13.18	- 5.14	-18.32	2∠ 3 1/2 X2 1/2 X 5/16	12.2	24.60	300.0	-18.12	2∠ 3 1/2 X2 1/2 X 5/16	12.2	23.81	290.4
11-12	+13.96	+ 5.46	+19.42	2∠ 5X 3 1/2 X 3/8	33.6	22.50	755.5	+19.20	2∠ 6X6X 3/8	29.8	20.53	611.0
12-13	-14.96	- 5.86	-20.92	2∠ 3 1/2 X2 1/2 X 5/16	12.2	28.10	342.4	-20.69	2∠ 3 1/2 X2 1/2 X 5/16	12.2	27.35	333.5
13-14	+15.88	+6.20	+22.08	2∠ 6X6X 3/8	29.8	26.25	782.5	+21.82	2∠ 6X6X 3/8	29.8	24.00	715.5
14-15	-16.76	- 6.55	-23.31	2∠ 3 1/2 X2 1/2 X 5/16	12.2	31.60	385.6	-23.05	2∠ 3 1/2 X2 1/2 X 5/16	12.2	30.93	377.0
15-15'	0.00	0.00	0.00	1∠ 3 1/2 X2 1/2 X 5/16	6.1	30.00	183.0	0.00	1∠ 3 1/2 X2 1/2 X 5/16	6.1	28.92	176.2
Totals							11991.4					11630.3

Centre Line Weight of Truss	23982.8
Total Weight of Details	3813.8
Corrected Weight of Truss	23260.6
Corrected Actual Weight	27074.4

Weight of Truss and Roof	62042.4
Detail Per Cent of Truss	14.07
Weight Per Square Foot	truss 8.46#
Horizontal Projection	roof 19.39#

SPAN 160'-0" RISE 30'-0" DISTANCE BETWEEN TRUSSES 20'-0" DISTANCE BETWEEN SUPPORTS 140'-0"

Member	Permanent and Snow Load Stress	Maximum Wind Load Stress	Maximum Stress	Section	Weight Per Foot of Length	Centre Line Length	Centre Line Weight	Corrected Maximum Stress	Corrected Section	Weight Per Foot of Length	Actual Length	Actual Weight of Member
B-1	-5.55	-1.93	-7.48	2L 3½X2½X5/16	12.2	10.69	130.4	-7.20	2L 3½X2½X5/16	12.2	10.61	129.5
C-2	-5.55	-1.43	-6.98	"	"	"	130.4	-6.70	"	"	9.52	116.0
D-4	+33.62	+8.30	+41.92	2L 5X3½X11/16	36.6	"	391.0	+40.25	2L 6X3X11/16	36.6	10.69	391.0
E-6	+42.90	+10.48	+53.38	"	"	"	391.0	+51.13	"	"	"	391.0
F-8	+44.20	+11.50	+55.70	"	"	"	391.0	+53.50	"	"	"	391.0
G-10	+43.55	+10.24	+53.79	"	"	"	391.0	+51.69	"	"	"	391.0
H-12	+41.00	+9.36	+50.36	"	"	"	391.0	+48.31	"	"	"	391.0
I-14	+37.50	+8.19	+45.69	"	"	"	391.0	+43.79	"	"	"	391.0
X-1	+5.18	+2.07	+7.25	2L 3½X2½X5/16	12.2	10.00	122.0	+6.99	2L 3½X2½X5/16	12.2	9.46	115.3
X-3	-31.53	-9.59	-41.12	2L 5X3½X⅝	33.6	"	336.0	-39.54	2L 5X3½X9/16	30.4	9.17	278.5
X-5	-40.00	-11.09	-51.09	"	"	"	336.0	-49.09	"	"	10.00	304.0
X-7	-41.75	-10.44	-52.19	"	"	"	336.0	-50.09	"	"	"	304.0
X-9	-40.70	-9.80	-50.50	"	"	"	336.0	-48.45	"	"	"	304.0
X-11	-38.25	-8.49	-46.74	"	"	"	336.0	-44.84	"	"	"	304.0
X-13	-35.06	-6.88	-41.94	"	"	"	336.0	-40.18	"	"	"	304.0
X-15	-31.33	-5.24	-36.57	"	"	"	336.0	-34.97	"	"	"	304.0
1-2	+3.94	+1.58	+5.52	1L 3½X2½X5/16	6.1	3.75	22.9	+5.32	1L 3½X2½X5/16	6.1	3.09	19.0
2-3	+45.95	+10.80	+56.75	2L 6X4X9/16	36.2	12.50	452.5	+54.35	2L 5X3½X11/16	36.6	12.27	449.0
3-4	-9.82	-1.77	-11.59	1L 3½X2½X5/16	6.1	7.50	45.7	-11.10	1L 3½X2½X5/16	6.1	6.83	41.7
4-5	+13.08	+2.32	+15.40	2L 4X3X⅜	17.0	15.00	255.0	+14.73	2L 3½X2½X7/16	16.6	14.28	237.0
5-6	-2.60	+1.07	-2.60	1L 3½X2½X5/16	6.1	11.25	68.6	-2.47	1L 3½X2½X5/16	6.1	10.62	64.8
6-7	+3.11	+1.31	+4.42	2L 3½X2½X5/16	12.2	18.00	219.5	+4.26	2L 3½X2½X5/16	12.2	16.77	204.5
7-8	+1.97	+1.84	+3.81	2L "	"	15.00	183.0	+3.71	"	"	14.33	175.0
8-9	-2.23	-2.02	-4.25	1L 3½X2½X5/16	6.1	22.10	134.8	-4.14	1L 3½X2½X5/16	6.1	20.97	128.0
9-10	+5.57	+3.02	+8.59	2L 4X3X⅜	17.0	18.75	318.5	+8.31	2L 3½X2½X7/16	16.6	17.80	295.6
10-11	-6.02	-3.30	-9.32	1L 3½X2½X5/16	6.1	24.60	150.0	-9.01	1L 3½X2½X5/16	6.1	23.70	144.3
11-12	+8.54	+4.06	+12.60	2L 5X3½X⅝	33.6	22.50	756.0	+12.17	2L 5X3½X11/16	36.6	20.90	764.5
12-13	-9.14	-4.38	-13.52	2L 3½X2½X5/16	12.2	28.10	342.6	-13.06	2L 3½X2½X5/16	12.2	27.22	332.3
13-14	+11.28	+4.99	+16.27	2L 6X4X9/16	36.2	26.25	950.0	+15.69	2L 5X3½X11/16	36.6	24.08	882.0
14-15	-11.82	-5.25	-17.07	2L 3½X2½X5/16	12.2	31.60	385.5	-16.48	2L 3½X2½X5/16	12.2	30.77	375.2
15-15'	0.00	0.00	0.00	1L 3½X2½X5/16	6.1	30.00	183.0	0.00	1L 3½X2½X5/16	6.1	28.63	174.7
Totals							9548.4					9216.9

Centre Line Weight of Truss	19075.8	Weight of Truss and Roof	55592.5
Total Weight of Details	2181.1	Detail Per Cent of Truss	11.83
Corrected Weight of Truss	18433.8	Weight Per Square Foot truss	6.46
Corrected Actual Weight	20614.9	Horizontal Projection roof	17.39

SPAN 160'-0" RISE 30'-0" DISTANCE BETWEEN TRUSSES 20'-0" DISTANCE BETWEEN SUPPORTS 120'-0"

Member	Permanent and Snow Load Stress	Maximum Wind Load Stress	Maximum Stress	Section	Weight Per Foot of Length	Centre Line Length	Centre Line Weight	Corrected Maximum Stress	Corrected Section	Weight Per Foot of Length	Actual Length	Actual Weight of Member
B-1	-5.58	-1.91	-7.49	2L 3½X2½X5/16	12.2	10.69	130.1	-7.22	2L 3½X2½X5/16	12.2	10.77	131.3
C-2	-5.58	-1.33	-6.91	"	"	"	130.1	-6.64	"	"	10.69	130.1
D-4	-10.84	-2.98	-13.82	"	"	"	130.1	-13.29	"	"	10.02	122.2
E-6	+12.20	+3.29	+15.49	2L 3½X3X9/16	22.8	"	243.6	+14.90	2L 3½X3X9/16	22.8	10.69	218.0
F-8	+21.32	+5.60	+26.92	"	"	"	243.6	+25.88	"	"	"	218.0
G-10	+24.60	+6.31	+30.91	"	"	"	243.6	+29.71	"	"	"	218.0
H-12	+25.10	+6.29	+31.39	"	"	"	243.6	+30.17	"	"	"	218.0
I-14	+23.80	+5.75	+29.55	"	"	"	243.6	+28.39	"	"	10.60	216.3
X-1	+5.16	+2.04	+7.20	2L 3½X2½X5/16	12.2	10.00	122.0	+6.95	2L 3½X2½X5/16	12.2	9.30	113.4
X-3	+10.10	+4.09	+14.19	"	12.2	"	122.0	+13.66	"	"	9.87	120.3
X-5	-11.44	-4.45	-15.89	2L 3½X3X7/16	18.2	"	182.0	-15.34	2L 3½X3X7/16	18.2	9.54	173.6
X-7	-19.89	-6.13	-26.02	"	"	"	182.0	-25.04	"	"	10.00	182.0
X-9	-23.07	-6.27	-29.34	"	"	"	182.0	-28.25	"	"	"	182.0
X-11	-23.53	-5.72	-29.25	"	"	"	182.0	-28.10	"	"	"	182.0
X-13	-22.20	-4.70	-26.90	"	"	"	182.0	-25.85	"	"	"	182.0
X-15	-20.20	-3.44	-23.64	"	"	"	182.0	-22.66	"	"	"	182.0
1-2	+3.74	+1.46	+5.20	1L 3½X2½X5/16	6.1	3.75	23.8	+5.02	1L 3½X2½X5/16	6.1	3.42	20.8
2-3	-6.25	-2.60	-8.85	"	"	12.50	76.2	-8.55	"	"	10.09	61.5
3-4	+5.65	+2.36	+8.01	2L "	12.2	7.50	91.5	+7.74	2L "	12.2	6.87	83.8
4-5	+32.52	+8.00	+40.52	2L 5X3½X11/16	36.6	15.00	549.2	+38.95	2L 5X3½X5/8	33.6	15.10	507.8
5-6	-12.71	-2.44	-15.15	2L 3½X2½X5/16	12.2	11.25	137.1	-14.54	2L 3½X2½X5/16	12.2	10.25	125.1
6-7	+15.25	+2.95	+18.20	2L 5X3½X3/8	20.8	18.00	384.4	+16.46	2L 5X3½X5/16	17.4	17.25	300.0
7-8	-5.65	-1.53	-7.18	1L 3½X2½X5/16	6.1	15.00	91.5	-6.91	1L 3½X2½X5/16	6.1	14.63	89.4
8-9	+6.44	+1.70	+8.14	2L 5X3½X5/16	17.4	22.10	384.4	+7.83	2L 5X3½X5/16	17.4	20.85	363.4
9-10	-0.82	-1.14	-1.96	1L 3½X2½X5/16	6.1	18.75	114.1	-1.92	1L 3½X2½X5/16	6.1	18.34	111.9
10-11	+0.86	+1.29	+2.15	2L 5X3½X5/16	17.4	24.60	428.5	+2.11	2L 5X3½X5/16	17.4	23.19	402.8
11-12	+4.11	+2.57	+6.68	"	17.4	22.50	391.7	+6.49	"	"	22.13	384.7
12-13	-3.18	-2.80	-5.98	1L 3½X2½X5/16	6.1	28.10	171.3	-5.83	1L 3½X2½X5/16	6.1	26.60	162.0
13-14	+6.32	+3.76	+10.08	2L 5X3½X11/16	36.6	26.25	962.0	+9.77	2L 5X3½X5/8	33.6	25.84	869.0
14-15	-6.73	-4.00	-10.73	1L 3½X2½X5/16	6.1	31.60	192.6	-10.40	1L 3½X2½X5/16	6.1	29.93	182.4
15-15'	0.00	0.00	0.00	"	"	30.00	183.0	0.00	"	"	28.75	175.1
Totals							7225.6					6828.9

Centre Line Weight of Truss	14451.2
Total Weight of Details	1671.1
Corrected Weight of Truss	13657.8
Corrected Actual Weight	15328.9

Weight of Truss and Roof	503065
Detail Per Cent of Truss	10.91
Weight Per Square Foot roof	15.72
Horizontal Projection truss	4.79

SPAN 160'-0" RISE 30'-0" DISTANCE BETWEEN TRUSSES 20'-0" DISTANCE BETWEEN SUPPORTS 100'-0"

Member	Permanent and Snow Load Stress	Maximum Wind Load Stress	Maximum Stress	Section	Weight Per Foot of Length	Centre Line Length	Centre Line Weight	Corrected Maximum Stress	Corrected Section	Weight Per Foot of Length	Actual Length	Actual Weight of Member
B-1	-5.30	-1.91	-7.21	2L 3½ X 2½ X 5/16	12.2	10.69	130.1	-7.18	2L 3½ X 2½ X 5/16	12.2	10.85	132.5
C-2	-5.30	-1.39	-6.69	"	"	"	130.1	-6.66	"	"	10.69	130.1
D-4	-10.29	-2.98	-13.27	"	"	"	130.1	-13.20	"	"	"	130.1
E-6	-15.39	-4.65	-20.04	"	"	"	130.1	-19.95	"	"	"	130.1
F-8	0.00	+0.23	+0.23	"	"	"	130.1	+0.23	"	"	"	130.1
G-10	+7.23	+2.52	+9.75	"	"	"	130.1	+9.72	"	"	"	130.1
H-12	+10.31	+3.43	+13.74	"	"	"	130.1	+13.70	"	"	"	130.1
I-14	+11.08	+3.59	+14.67	"	"	"	130.1	+14.63	"	"	"	130.1
X-1	+4.95	+2.04	+6.99	2L 3½ X 3 X 3/8	15.8	10.00	158.0	+6.97	2L 3½ X 3 X 5/8	15.8	9.37	148.0
X-3	+9.61	+4.09	+13.70	"	"	"	158.0	+13.66	"	"	10.00	158.0
X-5	+14.29	+6.16	+20.45	"	"	"	158.0	+20.36	"	"	10.00	158.0
X-7	0.00	-1.39	-1.39	2L 3½ X 2½ X 5/16	12.2	"	122.0	-1.39	2L 3½ X 2½ X 5/16	12.2	"	122.0
X-9	-6.76	-2.96	-9.72	"	"	"	122.0	-9.69	"	"	"	122.0
X-11	-9.61	-3.33	-12.94	"	"	"	122.0	-12.90	"	"	"	122.0
X-13	-10.31	-2.96	-13.27	"	"	"	122.0	-13.23	"	"	"	122.0
X-15	-9.61	-2.19	-11.80	"	"	"	122.0	-11.76	"	"	"	122.0
1-2	+3.56	+1.46	+5.02	1L "	6.1	3.75	23.8	+5.00	1L "	6.1	3.35	20.4
2-3	-5.95	-2.60	-8.55	"	"	12.50	76.3	-8.52	"	"	11.07	67.5
3-4	+5.38	+2.36	+7.74	2L "	12.2	7.50	91.5	+7.71	2L "	12.2	7.09	86.5
4-5	-7.15	-3.12	-10.27	1L "	6.1	15.00	91.5	-10.23	1L "	6.1	14.00	85.4
5-6	+7.12	+3.11	+10.23	2L "	12.2	11.25	137.1	-10.19	2L "	12.2	10.45	127.4
6-7	+25.43	+7.27	+32.70	2L 5 X 3½ X 11/16	36.6	18.00	659.5	+32.57	2L 5 X 3½ X 5/8	33.6	17.13	575.5
7-8	-12.47	-2.96	-15.43	2L 3½ X 2½ X 5/16	12.2	15.00	182.9	-15.36	2L 3½ X 2½ X 5/16	12.2	14.13	172.3
8-9	+14.12	+3.38	+17.50	2L 5 X 3½ X 9/16	30.4	22.10	671.5	+17.42	2L 5 X 3½ X ½	27.2	20.50	558.0
9-10	-6.41	-1.08	-7.49	1L 3½ X 2½ X 5/16	6.1	18.75	114.4	-7.45	1L 3½ X 2½ X 5/16	6.1	18.35	111.9
10-11	+7.12	+1.17	+8.29	2L 5 X 3½ X 7/16	24.0	24.60	590.5	+8.25	2L 5 X 3½ X 3/8	20.8	22.94	476.0
11-12	-1.75	-0.88	-2.63	1L 3½ X 2½ X 5/16	6.1	22.50	137.1	-2.62	1L 3½ X 2½ X 5/16	6.1	21.50	131.1
12-13	+1.82	+0.95	+2.77	2L 5 X 3½ X ½	27.2	28.10	765.0	+2.76	2L 5 X 3½ X 3/8	20.8	26.77	555.5
13-14	+1.96	+2.29	+4.25	2L 3½ X 3 X 5/8	25.0	26.25	656.5	+4.24	2L 3½ X 3 X 5/8	25.0	25.88	647.5
14-15	-2.14	-2.44	-4.58	1L 3½ X 2½ X 5/16	6.1	31.60	192.8	-4.57	1L 3½ X 2½ X 5/16	6.1	29.90	182.1
15-15'	0.00	0.00	0.00	"	"	30.00	183.0	0.00	"	"	28.83	175.9
Totals							6698.2					6690.2

Centre Line Weight of Truss	13396.4	Weight of Truss and Roof	48655.0
Total Weight of Details	1497.6	Detail Per Cent of Truss	10.95
Corrected Weight of Truss	12180.4	Weight Per Square Foot	roof 15.21
Corrected Actual Weight	13678.0	Horizontal Projection	truss 4.27

SPAN 160'-0" RISE 30'0" DISTANCE BETWEEN TRUSSES 20'-0" DISTANCE BETWEEN SUPPORTS 80'-0"

Member	Permanent and Snow Load Stress	Maximum Wind Load Stress	Maximum Stress	Section	Weight Per Foot of Length	Centre Line Length	Centre Line Weight	Corrected Maximum Stress	Corrected Section	Weight Per Foot of Length	Actual Length	Actual Weight of Member
B-1	-5.32	-1.91	-7.23	2L 3½X3X5/16	13.2	10.69	141.0	-7.29	2L 3½X3X5/16	13.2	10.69	141.0
C-2	-5.32	-1.33	-6.65	"	"	"	141.0	-6.71	"	"	"	141.0
D-4	-10.09	-2.98	-13.07	"	"	"	141.0	-13.18	"	"	"	141.0
E-6	-15.11	-4.65	-19.76	"	"	"	141.0	-19.94	"	"	"	141.0
F-8	-20.18	-6.39	-26.57	2L 3½X3X7/16	18.2	"	194.2	-26.89	2L 3½X3X7/16	18.2	"	194.2
G-10	-9.06	-2.28	-11.34	"	"	"	194.2	-11.44	"	"	"	194.2
H-12	-3.32	-0.15	-3.47	2L 3½X3X5/16	13.2	"	141.0	-3.51	2L 3½X3X5/16	13.2	"	141.0
I-14	-0.60	+0.86	+0.86	"	"	"	141.0	+0.86	"	"	"	141.0
X-1	+4.94	+2.04	+6.98	2L 3½X3X½	20.4	10.00	204.0	+7.03	2L 3½X3X½	20.4	10.00	204.0
X-3	+9.45	+4.09	+13.54	"	"	"	204.0	+13.65	"	"	"	204.0
X-5	+14.10	+6.16	+20.26	"	"	"	204.0	+20.43	"	"	"	204.0
X-7	+18.91	+8.32	+27.23	"	"	"	204.0	+27.44	"	"	"	204.0
X-9	+8.50	+1.02	+9.52	2L 3½X3X5/16	13.2	"	132.0	+9.62	2L 3½X3X5/16	13.2	"	132.0
X-11	+3.19	-0.34	+3.19	"	"	"	132.0	+3.23	"	"	"	132.0
X-13	+0.56	-0.83	-0.83	"	"	"	132.0	+0.83	"	"	"	132.0
X-15	-0.08	-0.61	-0.69	"	"	"	132.0	-0.69	"	"	"	132.0
1-2	+3.52	+1.46	+4.98	L 3½X2½X5/16	6.1	3.75	23.8	+5.02	L 3½X2½X5/16	6.1	3.42	20.8
2-3	-5.64	-2.60	-8.24	"	"	12.50	76.3	-8.30	"	"	11.25	68.6
3-4	+5.29	+2.36	+7.65	"	"	7.50	45.8	+7.70	"	"	7.17	43.7
4-5	-7.09	-3.12	-10.21	"	"	15.00	95.0	-10.28	"	"	14.00	85.4
5-6	+7.05	+3.11	+10.16	2L "	12.2	11.25	137.1	+10.23	2L "	12.2	10.92	133.3
6-7	-8.50	-3.78	-12.28	L 3½X3X5/16	6.6	18.00	118.9	-12.38	L 3½X3X5/16	6.6	17.09	112.7
7-8	+8.77	+3.78	+12.55	2L "	13.2	15.00	198.0	+12.65	2L "	13.2	14.67	193.5
8-9	+22.06	+7.01	+29.07	2L 6X4X9/16	36.2	22.10	800.0	+29.35	2L 6X4X9/16	36.2	20.69	749.0
9-10	-12.16	-3.36	-15.52	L 3½X3X7/16	9.1	18.75	170.7	-15.66	L 3½X3X7/16	9.1	18.42	167.5
10-11	+13.32	+3.66	+16.98	2L 6X4X½	32.4	24.60	796.5	+17.14	2L 6X4X7/16	28.6	22.69	649.0
11-12	-6.49	-1.27	-7.76	L 3½X2½X5/16	6.1	22.50	137.1	-7.82	L 3½X2½X5/16	6.1	22.17	135.0
12-13	+7.01	+1.33	+8.34	2L 6X4X7/16	28.6	28.10	804.0	+8.42	2L 6X4X⅜	24.6	26.43	650.2
13-14	-2.08	+0.51	-2.08	L 3½X2½X5/16	6.1	26.25	160.1	-2.10	L 3½X2½X5/16	6.1	23.92	145.9
14-15	+2.12	-0.54	+2.12	2L 6X4X9/16	36.2	31.60	1142.5	+2.14	2L 6X4X⅜	24.6	30.60	753.0
15-15'	0.00	0.00	0.00	L 3½X2½X5/16	6.1	30.00	183.0	0.00	L 3½X2½X5/16	6.1	28.50	173.8
Totals							7477.2					6661.8

Centre Line Weight of Truss	14954.4	Weight of Truss and Roof	50003.5
Total Weight of Details	1702.9	Detail Per Cent of Truss	11.34
Corrected Weight of Truss	13323.6	Weight Per Square Foot	Truss 4.70
Corrected Actual Weight	15026.5	Horizontal Projection	Roof 15.63

SPAN 160'-0" RISE 30'-0" DISTANCE BETWEEN TRUSSES 20'-0" DISTANCE BETWEEN SUPPORTS 60'-0"

Member	Permanent and Snow Load Stress	Maximum Wind Load Stress	Maximum Stress	Section	Weight Per Foot of Length	Centre Line Length	Centre Line Weight	Corrected Maximum Stress	Corrected Section	Weight Per Foot of Length	Actual Length	Actual Weight of Member
B-1	-5.30	-1.91	-7.21	2L 3½X2½X5/16	12.2	10.69	130.1	-7.30	2L 3½X2½X5/16	12.2	10.69	130.1
C-2	-5.30	-1.39	-6.69	"	"	"	130.1	-6.78	"	"	"	130.1
D-4	-10.29	-2.98	-13.27	"	"	"	130.1	-13.45	"	"	"	130.1
E-6	-15.39	-4.65	-20.04	"	"	"	130.1	-20.28	"	"	"	130.1
F-8	-20.30	-6.39	-26.69	2L 3½X2½X5/8	23.0	"	246.0	-27.02	2L 3½X2½X½	18.8	"	201.0
G-10	-25.36	-8.12	-33.48	"	"	"	246.0	-33.91	"	"	"	201.0
H-12	-16.98	-4.10	-21.08	2L 3½X2½X3/8	14.4	"	153.9	-21.38	2L 3½X2½X5/16	12.2	"	130.1
I-14	-12.15	-1.81	-13.96	"	"	"	153.9	-14.17	"	"	"	130.1
X-1	+4.95	+2.04	+6.99	2L 3½X2½X9/16	20.8	10.00	208.0	+7.08	2L 3½X2½X9/16	20.8	10.00	208.0
X-3	+9.61	+4.09	+13.70	"	"	"	208.0	+13.88	"	"	"	208.0
X-5	+14.29	+6.16	+20.45	"	"	"	208.0	+20.67	"	"	"	208.0
X-7	+19.11	+8.32	+27.43	"	"	"	208.0	+27.80	"	"	"	208.0
X-9	+23.83	+10.48	+34.31	2L 3½X2½X¾	26.8	"	268.0	+34.72	2L 3½X2½X¾	26.8	"	268.0
X-11	+15.90	+2.79	+18.69	"	"	"	268.0	+18.98	"	"	"	268.0
X-13	+11.40	+1.14	+12.54	2L 3½X2½X5/16	12.2	"	122.0	+12.74	2L 3½X2½X5/16	12.2	"	122.0
X-15	+9.47	+0.42	+9.89	"	"	"	122.0	+10.05	"	"	"	122.0
1-2	+3.56	+1.58	+5.14	L "	6.1	3.75	23.8	+5.20	L "	6.1	3.42	20.8
2-3	-5.95	-2.60	-8.55	"	"	12.50	76.3	-8.65	"	"	11.00	67.1
3-4	+5.38	+2.36	+7.74	"	"	7.50	45.7	+7.83	"	"	7.17	43.7
4-5	-7.15	-3.12	-10.27	"	"	15.00	91.5	-10.39	"	"	14.00	85.4
5-6	+7.12	+3.11	+10.23	2L "	12.2	11.25	137.1	+10.35	2L "	12.2	10.88	132.6
6-7	-8.65	-3.78	-12.43	L 3½X2½X⅜	7.2	18.00	129.6	-12.58	L 3½X2½X⅜	7.2	17.09	123.0
7-8	+8.90	+3.78	+12.68	2L 3½X3X7/16	18.2	15.00	273.0	+12.73	2L 3½X3X5/16	13.2	14.67	193.6
8-9	-10.15	-4.38	-14.53	L 3½X3X⅜	7.9	22.10	174.3	-14.69	L 3½X3X⅜	7.9	20.85	165.0
9-10	+10.68	+4.67	+15.35	2L 3½X3X½	20.4	18.75	382.4	+15.51	2L 3½X3X½	20.4	18.42	375.8
10-11	+19.40	+7.74	+27.14	T 2L 6X4X⅜ 1pl. 9X⅜	36.1	24.60	887.5	+27.36	T 2L 5X3½X7/16 1pl. 8X7/16	33.9	22.80	774.4
11-12	-11.21	-4.31	-15.52	L 3½X3X9/16	9.1	22.50	204.6	-15.71	L 3½X3X9/16	9.1	22.17	208.0
12-13	+12.00	+4.59	+16.59	T 2L 6X4X⅜ 1pl. 9X⅜	36.1	28.10	1013.0	+16.79	T 2L 5X3½X7/16 1pl. 8X7/16	33.9	26.60	902.5
13-14	-6.01	-2.19	-8.20	L 3½X2½X9/16	6.1	26.25	160.2	-8.30	L 3½X2½X5/16	6.1	23.95	146.0
14-15	+6.30	+2.28	+8.58	T 2L 6X4X⅜ 1pl. 9X⅜	36.1	31.60	1140.0	+8.68	T 2L 5X3½X7/16 1pl. 8X7/16	33.9	30.60	1039.0
15-15'	0.00	0.00	0.00	L 3½X2½X5/16	6.1	30.00	183.0	0.00	L 3½X2½X5/16	6.1	28.42	173.5
Totals							7854.2					7245.0

Centre Line Weight of Truss	15708.4
Total Weight of Details	1879.7
Corrected Weight of Truss	14490.0
Corrected Actual Weight	16369.7

Weight of Truss and Roof	51346.7
Detail Per Cent of Truss	12.69
Weight Per Square Foot	roof 16.04
Horizontal Projection	truss 3.11

SPAN 160'-0" RISE 30'-0" DISTANCE BETWEEN TRUSSES 20'-0" DISTANCE BETWEEN SUPPORTS 40'-0"

Member	Permanent and Snow Load Stress	Maximum Wind Load Stress	Maximum Stress	Section	Weight Per Foot of Length	Centre Line Length	Centre Line Weight	Corrected Maximum Stress	Corrected Section	Weight Per Foot of Length	Actual Length	Actual Weight of Member
B-1	-5.36	-1.91	-7.27	2L 3½x3x5/16	13.2	10.69	141.0	-7.42	2L 3½x3x5/16	13.2	10.69	141.0
C-2	-5.36	-1.39	-6.75	"	"	"	141.0	-6.90	"	"	"	141.0
D-4	-10.36	-2.98	-13.34	"	"	"	141.0	-13.61	"	"	"	141.0
E-6	-15.59	-4.65	-20.24	"	"	"	141.0	-20.66	"	"	"	141.0
F-8	-20.90	-6.39	-27.29	2L 3½x3x9/16	22.8	"	243.8	-27.87	2L 3½x3x9/16	22.8	"	243.8
G-10	-25.36	-8.12	-34.08	"	"	"	243.8	-34.76	"	"	"	243.8
H-12	-31.00	-9.87	-40.87	2L 3½x3x11/16	27.2	"	290.4	-41.71	2L 3½x3x11/16	27.2	"	290.4
I-14	-24.39	-5.30	-29.69	"	"	"	290.4	-30.22	"	"	"	290.4
X-1	+4.93	+2.04	+6.97	2L 3½x3x½	20.4	10.00	204.0	+7.11	2L 3½x3x½	20.4	9.42	192.0
X-3	+9.69	+4.09	+13.78	"	"	"	204.0	+14.04	"	"	10.00	204.0
X-5	+14.68	+6.16	+20.84	"	"	"	204.0	+21.25	"	"	"	204.0
X-7	+19.46	+8.32	+27.78	"	"	"	204.0	+28.32	"	"	"	204.0
X-9	+24.89	+10.48	+35.37	2L 3½x3x11/16	27.2	"	272.0	+35.94	2L 3½x3x11/16	27.2	"	272.0
X-11	+29.12	+12.55	+41.67	"	"	"	272.0	+42.48	"	"	"	272.0
X-13	+22.80	+3.26	+26.06	2L 3½x3x7/16	18.2	"	182.0	+26.68	2L 3½x3x7/16	18.2	"	182.0
X-15	+19.46	+1.04	+20.50	"	"	"	182.0	+21.04	"	"	"	182.0
1-2	+3.60	+1.58	+5.18	L 3½x2½x5/16	6.1	3.75	23.8	+5.28	L 3½x2½x5/16	6.1	3.42	20.8
2-3	-5.90	-2.60	-8.50	"	"	12.50	76.3	-8.66	"	"	11.09	67.5
3-4	+5.45	+2.36	+7.81	"	"	7.50	45.8	+7.96	"	"	7.17	43.7
4-5	-7.41	-3.12	-10.53	"	"	15.00	91.5	-10.73	"	"	13.92	84.7
5-6	+7.20	+3.11	+10.31	2L "	12.2	11.25	137.1	+10.51	2L "	12.2	10.92	131.1
6-7	-8.65	-3.78	-12.43	L 3½x3x5/16	6.6	18.00	118.9	-12.67	L 3½x3x5/16	6.6	17.00	112.3
7-8	+8.94	+3.78	+12.72	2L "	13.2	15.00	198.0	+12.97	2L "	13.2	14.67	193.8
8-9	-10.11	-4.38	-14.49	L 3½x3x3/8	7.9	22.10	174.5	-14.78	L 3½x3x3/8	7.9	21.18	159.2
9-10	+10.52	+4.67	+15.19	2L 5x3½x3/8	20.8	18.75	390.0	+15.48	2L 5x3½x3/8	20.8	18.00	410.5
10-11	-11.71	-5.12	-16.83	L 3½x3x7/16	9.1	24.60	224.0	-17.14	L 3½x3x7/16	9.1	23.47	211.3
11-12	+12.58	+5.49	+18.07	2L 5x3½x½	27.2	22.50	611.5	+18.40	2L 5x3½x½	27.2	21.08	604.0
12-13	+17.47	+10.11	+27.58	T 2L 6x4x9/16 1pl. 9x7/16	53.4	28.10	1500.0	+28.06	T 2L 6x4x9/16 1pl. 9x7/16	47.7	27.35	1302.0
13-14	-10.37	-6.51	-16.88	L 3½x3x7/16	9.1	26.25	239.0	-17.17	L 3½x3x7/16	9.1	24.00	218.2
14-15	+10.80	+6.86	+17.66	T 2L 6x4x5/8 1pl. 9x5/8	59.1	31.60	1868.0	+17.96	T 2L 6x4x½ 1pl. 9x½	47.7	31.10	1483.0
15-15'	0.00	0.00	0.00	L 3½x2½x5/16	6.1	30.00	183.0	0.00	L 3½x2½x5/16	6.1	28.25	172.3
Totals							9437.8					85568

Centre Line Weight of Truss	18875.6	Weight of Truss and Roof	54246.3
Total Weight of Details	2156.7	Detail Per Cent of Truss	12.59
Corrected Weight of Truss	17113.6	Weight Per Square Foot	roof 16.95
Corrected Actual Weight	19269.3	Horizontal Projection	truss 6.02

SPAN 160'-0" RISE 30'-0" DISTANCE BETWEEN TRUSSES 20'-0" DISTANCE BETWEEN SUPPORTS 20'-0"

Member	Permanent and Snow Load Stress	Maximum Wind Load Stress	Maximum Stress	Section	Weight Per Foot of Length	Centre Line Length	Centre Line Weight	Corrected Maximum Stress	Corrected Section	Weight Per Foot of Length	Actual Length	Actual Weight of Member
B-1	-5.51	-1.91	-7.42	2L 5 X 3½ X 5/16	17.4	10.69	185.8	-7.50	2L 5 X 3½ X 5/16	17.4	10.84	188.8
C-2	-5.51	-1.39	-6.90	"	"	"	185.8	-6.98	"	"	10.69	185.8
D-4	-10.65	-2.98	-13.63	"	"	"	185.8	-13.78	"	"	"	185.8
E-6	-16.01	-4.65	-20.66	2L 5 X 3½ X 5/16	"	"	185.8	-20.89	"	"	"	185.8
F-8	-21.49	-6.39	-27.88	"	"	"	185.8	-28.19	"	"	"	185.8
G-10	-26.64	-8.12	-34.76	2L 5 X 3½ X 9/16	30.4	"	326.6	-35.15	2L 5 X 3½ X 9/16	30.4	"	326.6
H-12	-31.84	-9.87	-41.71	"	"	"	326.6	-42.15	"	"	"	326.6
I-14	-37.18	-11.77	-48.95	"	"	"	326.6	-49.41	"	"	"	326.6
X-1	+5.07	+2.04	+7.11	2L 5 X 3½ X 5/16	17.4	10.00	174.0	+7.18	2L 5 X 3½ X 5/16	17.4	9.00	156.6
X-3	+9.95	+4.09	+14.04	"	"	"	174.0	+14.18	"	"	10.00	174.0
X-5	+15.09	+6.16	+21.25	"	"	"	174.0	+21.46	"	"	"	174.0
X-7	+20.00	+8.32	+28.32	2L 5 X 3½ X 7/16	24.0	"	240.0	+28.58	2L 5 X 3½ X 7/16	24.0	"	240.0
X-9	+25.46	+10.48	+35.94	"	"	"	240.0	+36.29	"	"	"	240.0
X-11	+29.93	+12.55	+42.48	2L 5 X 3½ X 5/8	33.6	"	336.0	+42.18	2L 5 X 3½ X 5/8	33.6	"	336.0
X-13	+34.80	+14.89	+49.69	"	"	"	336.0	+50.16	"	"	"	336.0
X-15	+30.00	-0.29	+30.00	2L 5 X 3½ X 7/16	24.0	"	240.0	+30.41	2L 5 X 3½ X 7/16	24.0	"	240.0
1-2	+3.70	+1.58	+5.28	1L 3½ X 2½ X 5/16	6.1	3.75	23.8	+5.33	1L 3½ X 2½ X 5/16	6.1	3.25	19.7
2-3	-6.06	-2.60	-8.66	"	"	12.50	76.3	-8.75	"	"	10.75	65.5
3-4	+5.60	+2.36	+7.96	"	"	7.50	45.8	+8.04	"	"	7.00	42.7
4-5	-7.61	-3.12	-10.73	"	"	15.00	91.5	-10.84	"	"	13.83	84.5
5-6	+7.40	+3.11	+10.51	2L "	12.2	11.25	137.1	+10.61	2L "	12.2	10.75	131.1
6-7	-8.89	-3.78	-12.67	1L 3½ X 2½ X 3/8	7.2	18.00	129.6	-12.79	1L 3½ X 2½ X 3/8	7.2	16.92	121.9
7-8	+9.19	+3.78	+12.97	2L 3½ X 2½ X 7/16	16.6	15.00	249.0	+13.09	2L 3½ X 2½ X 7/16	16.6	14.50	240.7
8-9	-10.40	-4.38	-14.78	1L "	8.3	22.10	183.3	-14.92	1L "	8.3	21.00	174.0
9-10	+10.81	+4.67	+15.48	2L 5 X 3½ X 5/16	17.4	18.75	326.0	+15.65	2L 5 X 3½ X 5/16	17.4	18.25	317.6
10-11	-12.02	-5.12	-17.14	1L "	8.7	24.60	214.0	-17.32	1L "	8.7	22.60	196.7
11-12	+12.91	+5.49	+18.40	2L 5 X 3½ X 9/16	30.4	22.50	684.5	+18.59	2L 5 X 3½ X 9/16	30.4	21.92	665.5
12-13	-13.80	-5.72	-19.52	1L 5 X 3½ X 3/8	10.4	28.10	292.0	-19.71	1L 5 X 3½ X 3/8	10.4	25.94	269.6
13-14	+14.80	+6.09	+20.89	2L 6 X 4 X 11/16	43.6	26.25	1147.0	+21.09	2L 6 X 4 X 5/8	40.0	24.67	987.7
14-15	+15.60	+19.06	+34.66	T 2L 6 X 4 X 3/8 PL 10 X 5/8 PL 10 X 5/8	59.1	31.60	1868.0	+34.87	T 2L 6 X 4 X 3/8 PL 10 X 5/8 PL 10 X 5/8	59.1	30.60	1810.0
15-15'	0.00	0.00	0.00	2L 3½ X 2½ X 5/16	12.2	30.00	366.0	0.00	2L 3½ X 2½ X 5/16	12.2	27.92	340.6
Totals							9656.7					9266.2

Centre Line Weight of Truss	19313.4	Weight of Truss and Roof	55893.1
Total Weight of Details	23837	Detail Per Cent of Truss	12.86
Corrected Weight of Truss	18532.4	Weight Per Square Foot roof	17.47
Corrected Actual Weight	20916.1	Horizontal Projection truss	6.53

SPAN 140'-0" RISE 26'-3" DISTANCE BETWEEN TRUSSES 20'-0" DISTANCE BETWEEN SUPPORTS 140'-0"

Member	Permanent and Snow Load Stress	Maximum Wind Load Stress	Maximum Stress	Section	Weight Per Foot of Length	Centre Line Length	Centre Line Weight	Corrected Maximum Stress	Corrected Section	Weight Per Foot of Length	Actual Length	Actual Weight of Member
B-1	+72.06	+17.86	+89.92	2L 6X6X¾	57.4	10.69	612.5	+88.86	2L 6X6X¾	57.4	11.02	632.5
C-2	+72.06	+18.39	+90.45	"	"	"	612.5	+89.39	"	"	10.69	612.5
D-4	+66.65	+16.79	+83.44	"	"	"	612.5	+82.44	"	"	"	612.5
E-6	+61.20	+15.11	+76.31	2L 6X6X⅝	48.4	"	515.5	+75.41	2L 6X6X⅝	48.4	"	515.5
F-8	+55.60	+13.39	+68.99	"	"	"	515.5	+68.19	"	"	"	515.5
G-10	+50.20	+11.69	+61.89	2L 6X6X½	39.2	"	419.0	+61.19	2L 6X6X½	39.2	"	419.0
H-12	+44.65	+10.00	+54.65	"	"	"	419.0	+54.00	"	"	"	419.0
X-1	-67.50	-19.01	-86.51	2L 6X6X 9/16	43.8	10.00	438.0	-85.51	2L 6X6X 9/16	43.8	9.67	424.0
X-3	-62.45	-17.03	-79.48	"	"	"	438.0	-78.53	"	"	10.00	438.0
X-5	-57.40	-14.94	-72.34	"	"	"	438.0	-71.44	"	"	"	438.0
X-7	-52.05	-12.82	-64.87	2L 6X6X 7/16	34.4	"	344.0	-67.21	2L 6X6X 7/16	34.4	"	344.0
X-9	-46.85	-10.69	-57.54	"	"	"	344.0	-56.79	"	"	"	344.0
X-11	-41.75	-8.64	-50.39	2L 6X6X 7/16	"	"	344.0	-49.74	"	"	"	344.0
X-13	-36.40	-6.57	-42.97	"	"	"	344.0	-42.32	"	"	"	344.0
1-2	+3.90	+1.55	+5.45	L 3½X2½X 5/16	6.1	3.75	22.8	+5.39	L 3½X2½X 5/16	6.1	3.25	19.7
2-3	-6.35	-2.50	-8.85	"	"	12.50	76.4	-8.75	"	"	10.75	65.5
3-4	+5.77	+2.34	+8.11	"	"	7.50	45.8	+8.03	"	"	7.00	42.7
4-5	-7.79	-3.14	-10.93	"	"	15.00	91.5	-10.81	"	"	13.83	84.5
5-6	+7.85	+3.17	+11.02	2L "	12.2	11.25	137.1	+10.90	2L "	12.2	10.75	131.1
6-7	-9.52	-3.81	-13.33	L 3½X2½X⅜	7.2	18.00	129.6	-13.20	L 3½X2½X⅜	7.2	16.92	121.9
7-8	+9.87	+3.92	+13.79	2L 3½X2½X½	18.8	15.00	282.0	+13.64	2L 3½X2½X 7/16	16.6	14.50	240.7
8-9	-11.08	-4.44	-15.52	L "	9.4	22.10	207.8	-15.34	L "	8.3	20.69	171.7
9-10	+11.70	+4.65	+16.35	2L 5X3½X⅜	20.8	18.75	389.7	+16.16	2L 5X3½X 5/16	17.4	17.75	309.2
10-11	-12.87	-5.11	-17.98	L 3½X2½X 9/16	10.4	24.60	256.0	-17.78	L 3½X2½X 9/16	10.4	23.35	242.6
11-12	+13.80	+5.41	+19.21	2L 5X3½X⅜	33.6	22.50	755.5	+19.00	2L 5X3½X 9/16	30.4	21.42	651.5
12-13	-14.81	-5.82	-20.63	L 3½X2½X⅝	11.5	28.10	323.5	-20.41	L 3½X2½X⅝	11.5	26.90	309.6
13-13'	0.00	0.00	0.00	L 3½X2½X 5/16	6.1	26.25	160.1	0.00	L 3½X2½X 5/16	6.1	25.25	154.0
Totals							9274.3					8947.2

Centre Line Weight of Truss	18548.6	Weight of Truss and Roof	51496.1
Total Weight of Details	2996.7	Detail Per Cent of Truss	14.32
Corrected Weight of Truss	17894.4	Weight Per Square Foot	roof 18.39
Corrected Actual Weight	20891.1	Horizontal Projection	Truss 7.46

SPAN 120'-0" RISE 22'-6" DISTANCE BETWEEN TRUSSES 20'-0" DISTANCE BETWEEN SUPPORTS 120'-0"

Member	Permanent and Snow Load Stress	Maximum Wind Load Stress	Maximum Stress	Section	Weight Per Foot of Length	Centre Line Length	Centre Line Weight	Corrected Maximum Stress	Corrected Section	Weight Per Foot of Length	Actual Length	Actual Weight of Member
B-1	+59.10	+14.94	+74.04	2L 6X4X 3/4	47.2	10.69	504.5	+72.79	2L 6X4X 3/4	47.2	10.94	516.0
C-2	+59.10	+15.50	+74.60	"	"	"	504.5	+73.35	"	"	10.69	504.5
D-4	+53.78	+13.87	+67.65	"	"	"	504.5	+66.47	"	"	"	504.5
E-6	+48.30	+12.29	+60.59	"	"	"	504.5	+59.49	"	"	"	504.5
F-8	+42.68	+10.61	+53.29	2L 6X4X 9/16	36.2	"	386.5	+52.27	2L 6X4X 9/16	36.2	"	386.5
G-10	+37.30	+8.91	+46.21	"	"	"	386.5	+45.31	"	"	"	386.5
X-1	-55.90	-16.01	-71.91	"	"	10.00	362.0	-70.56	"	"	9.33	3380
X-3	-50.35	-13.97	-64.32	"	"	"	362.0	-63.12	"	"	10.00	362.0
X-5	-45.03	-11.98	-57.01	"	"	"	362.0	-55.98	"	"	"	362.0
X-7	-39.80	-9.86	-49.66	"	"	"	362.0	-48.76	"	"	"	362.0
X-9	-34.85	-7.74	-42.59	2L 6X4X 3/8	24.6	"	246.0	-41.79	2L 6X4X 3/8	24.6	"	246.0
X-11	-29.75	-5.70	-35.45	"	"	"	246.0	-34.75	"	"	"	246.0
1-2	+3.80	+1.55	+5.35	1L 3½X2½X 5/16	6.1	3.75	22.8	+5.26	1L 3½X2½X 5/16	6.1	3.25	19.7
2-3	-6.42	-2.52	-8.94	"	"	12.50	76.4	-8.79	"	"	11.00	67.1
3-4	+5.70	+2.32	+8.02	"	"	7.50	45.8	+7.88	"	"	7.00	42.7
4-5	-7.60	-3.08	-10.68	"	"	15.00	91.5	-10.51	"	"	14.08	85.9
5-6	+7.67	+3.08	+10.75	2L "	12.2	11.25	137.1	+10.58	2L "	12.2	10.75	131.1
6-7	-9.16	-3.77	-12.93	1L 3½X2½X 3/8	7.2	18.00	129.6	-12.72	1L 3½X2½X 3/8	7.2	17.17	123.6
7-8	+9.38	+3.79	+13.17	2L 3½X2½X½	18.8	15.00	282.0	+12.95	2L 3½X2½X 7/16	16.6	14.50	240.7
8-9	-10.74	-4.45	-15.19	1L 3½X2½X 7/16	8.3	22.10	183.3	-14.95	1L "	8.3	21.00	174.1
9-10	+11.40	+4.67	+16.07	2L 3½X3X 9/16	22.8	18.75	427.2	+15.80	2L 3½X3X½	20.4	18.25	372.2
10-11	-12.50	-5.10	-17.60	1L 3½X2½X 9/16	10.4	24.60	255.8	-17.31	1L 3½X2½X½	9.4	23.43	220.1
11-11'	0.00	0.00	0.00	1L 3½X2½X 5/16	6.1	22.50	137.2	0.00	1L 3½X2½X 5/16	6.1	21.42	130.8
Totals							6519.7					6334.5

Centre Line Weight of Truss	13039.4	Weight of Truss and Roof	40868.4
Total Weight of Details	1966.6	Detail Per Cent of Truss	15.52
Corrected Weight of Truss	12669.0	Weight Per Square Foot	roof 17.03
Corrected Actual Weight	14635.6	Horizontal Projection	truss 6.10

SPAN 100'-0" RISE 18'-9" DISTANCE BETWEEN TRUSSES 20'-0" DISTANCE BETWEEN SUPPORTS 100'-0"

Member	Permanent and Snow Load Stress	Maximum Wind Load Stress	Maximum Stress	Section	Weight Per Foot of Length	Centre Line Length	Centre Line Weight	Corrected Maximum Stress	Corrected Section	Weight Per Foot of Length	Actual Length	Actual Weight of Member
B-1	+46.55	+11.61	+58.16	2 ∠ 5 X 3½ X ⅞	39.6	10.69	423.0	+57.01	2 ∠ 5 X 3½ X 11/16	36.6	10.94	400.5
C-2	+46.55	+12.20	+58.75	"	"	"	423.0	+57.60	"	"	10.69	391.2
D-4	+41.05	+10.60	+51.65	"	"	"	423.0	+50.63	"	"	"	391.2
E-6	+36.00	+8.94	+44.94	2 ∠ 5 X 3½ X 9/16	30.4	"	324.4	+43.85	2 ∠ 5 X 3½ X 9/16	30.4	"	324.4
F-8	+30.68	+7.23	+37.91	"	"	"	324.4	+37.18	"	"	"	324.4
X-1	-43.52	-12.40	-55.92	"	"	10.00	304.0	-54.90	2 ∠ 5 X 3½ X ½	27.2	9.50	258.1
X-3	-38.38	-10.47	-48.85	"	"	"	304.0	-47.87	"	"	10.00	272.0
X-5	-33.61	-8.35	-41.96	"	"	"	304.0	-41.15	"	"	"	272.0
X-7	-28.73	-6.28	-35.01	2 ∠ 5 X 3½ X ⅜	20.8	"	208.0	-34.28	2 ∠ 5 X 3½ X ⅜	20.8	"	208.0
X-9	-23.80	-4.21	-28.01	"	"	"	208.0	-27.41	"	"	"	208.0
1-2	+ 3.66	+1.55	+ 5.21	1 ∠ 3½ X 2½ X 5/16	6.1	3.75	22.8	+ 5.12	1 ∠ 3½ X 2½ X 5/16	6.1	3.31	20.2
2-3	- 6.45	-2.50	-8.95	"	"	12.50	76.4	- 8.79	"	"	11.17	68.1
3-4	+ 5.41	+2.32	+ 7.73	"	"	7.50	45.8	+ 7.61	"	"	7.08	43.2
4-5	- 7.22	-3.14	-10.36	"	"	15.00	91.5	-10.19	"	"	14.17	86.4
5-6	+ 7.32	+3.17	+10.49	2 ∠ "	12.2	11.25	137.1	+10.22	2 ∠ "	12.2	10.83	132.2
6-7	-8.85	-3.77	-12.62	1 ∠ 3½ X 2½ X ⅜	7.2	18.00	129.6	-12.40	1 ∠ 3½ X 2½ X ⅜	7.2	17.00	122.4
7-8	+9.11	+3.85	+12.96	2 ∠ 3½ X 2½ X 7/16	16.6	15.00	249.0	+12.73	2 ∠ 3½ X 2½ X 7/16	16.6	14.58	242.0
8-9	-10.36	-4.45	-14.81	1 ∠ "	8.3	22.10	183.3	-14.54	1 ∠ "	8.3	21.27	176.6
9-9'	0.00	0.00	0.00	1 ∠ 3½ X 2½ X 5/16	6.1	18.75	114.2	0.00	1 ∠ 3½ X 2½ X 5/16	6.1	17.58	107.1
Totals							4295.5					4048.0

Centre Line Weight of Truss	8591.0	Weight of Truss and Roof	31367.2
Total Weight of Details	1410.6	Detail Per Cent of Truss	17.31
Corrected Weight of Truss	8096.0	Weight Per Square Foot	roof 15.68
Corrected Actual Weight	9506.6	Horizontal Projection	truss 4.76

SPAN 80'-0" RISE 15'-0" DISTANCE BETWEEN TRUSSES 20'-0" DISTANCE BETWEEN SUPPORTS 80'-0"

Member	Permanent and Snow Load Stress	Maximum Wind Load Stress	Maximum Stress	Section	Weight Per Foot of Length	Centre Line Length	Centre Line Weight	Corrected Maximum Stress	Corrected Section	Weight Per Foot of Length	Actual Length	Actual Weight of Member
B-1	+34.80	+9.18	+43.98	2L 5 X 3½ X 2/16	30.4	10.69	324.4	+43.88	2L 5 X 3½ X 2/16	30.4	10.94	332.2
C-2	+34.80	+9.61	+44.41	"	"	"	324.4	+44.31	"	"	10.69	324.4
D-4	+30.30	+8.06	+38.36	"	"	"	324.4	+38.27	"	"	"	324.4
E-6	+24.66	+6.40	+31.06	"	"	"	324.4	+31.00	"	"	"	324.4
X-1	-32.60	-9.80	-42.40	2L 5 X 3½ X 7/16	24.0	10.00	240.0	-42.30	2L 5 X 3½ X 7/16	24.0	9.50	228.0
X-3	-28.12	-7.74	-35.86	"	"	"	240.0	-35.78	"	"	10.00	240.0
X-5	-23.40	-5.64	-29.04	"	"	"	240.0	-28.98	"	"	"	240.0
X-7	-18.68	-3.51	-22.19	"	"	"	240.0	-22.14	"	"	"	240.0
1-2	+3.50	+1.55	+5.05	1L 3½ X 2½ X 5/16	6.1	3.75	22.8	+5.04	1L 3½ X 2½ X 5/16	6.1	3.33	20.3
2-3	-5.65	-2.50	-8.15	"	"	12.50	76.4	-8.13	"	"	11.25	68.6
3-4	+5.25	+2.32	+7.57	"	"	7.50	45.8	+7.55	"	"	7.08	43.1
4-5	-7.04	-3.14	-10.18	"	"	15.00	91.5	-10.15	"	"	14.17	86.3
5-6	+7.00	+3.17	+10.17	2L 5 "	12.2	11.25	137.1	+10.14	2L 5 "	12.2	10.83	132.1
6-7	-8.44	-3.77	-12.21	1L 3½ X 2½ X ⅜	7.2	18.00	129.6	-12.18	1L 3½ X 2½ X ⅜	7.2	17.42	125.5
7-7'	0.00	0.00	0.00	1L 3½ X 2½ X 5/16	6.1	15.00	91.5	0.00	1L 3½ X 2½ X 5/16	6.1	14.33	87.5
Totals							2852.3					2816.8

Centre Line Weight of Truss	5704.6	Weight of Truss and Roof	23807.9
Total Weight of Details	675.6	Detail Per Cent of Truss	11.99
Corrected Weight of Truss	5633.6	Weight Per Square Foot	roof 14.87
Corrected Actual Weight	6309.2	Horizontal Projection	truss 3.93

SPAN 60'-0" RISE 11'-3" DISTANCE BETWEEN TRUSSES 20'-0" DISTANCE BETWEEN SUPPORTS 60'-0"

Member	Permanent and Snow Load Stress	Maximum Wind Load Stress	Maximum Stress	Section	Weight Per Foot of Length	Centre Line Length	Centre Line Weight	Corrected Maximum Stress	Corrected Section	Weight Per Foot of Length	Actual Length	Actual Weight of Member
B-1	+23.82	+6.30	+30.12	2L 5 X 3½ X ⅜	20.8	10.69	222.0	+30.00	2L 5 X 3½ X ⅜	20.8	10.77	223.9
C-2	+23.82	+6.86	+30.68	"	"	"	222.0	+30.56	"	"	10.69	222.0
D-4	+19.08	+5.23	+24.31	"	"	"	222.0	+24.22	"	"	"	222.0
X-1	-22.37	-6.75	-29.12	2L 5 X 3½ X 5/16	17.2	10.00	172.0	-29.01	2L 5 X 3½ X 5/16	17.2	9.50	163.4
X-3	-17.88	-4.67	-22.55	"	"	"	172.0	-22.46	"	"	10.00	172.0
X-5	-13.36	-2.58	-15.94	"	"	"	172.0	-15.87	"	"	"	172.0
1-2	+3.39	+1.55	+4.94	1L 3½ X 2½ X 5/16	6.1	3.75	22.8	+4.92	1L 3½ X 2½ X 5/16	6.1	3.33	20.3
2-3	-5.66	-2.50	-8.16	"	"	12.50	76.4	-8.13	"	"	11.25	68.6
3-4	+5.09	+2.32	+7.41	"	"	7.50	45.8	+7.38	"	"	7.08	43.1
4-5	-6.85	-3.14	-9.99	"	"	15.00	91.5	-9.95	"	"	14.17	86.3
5-5'	0.00	0.00	0.00	"	"	11.25	68.7	0.00	"	"	10.50	64.0
Totals							1487.2					14576

Centre Line Weight of Truss	2974.4	Weight of Truss and Roof	16415.6
Total Weight of Details	414.1	Detail Per Cent of Truss	14.20
Corrected Weight of Truss	2913.2	Weight Per Square Foot	roof 13.68
Corrected Actual Weight	3329.3	Horizontal Projection	truss 2.77

SPAN 40'-0" RISE 7'-6" DISTANCE BETWEEN TRUSSES 20'-0" DISTANCE BETWEEN SUPPORTS 40'-0"

Member	Permanent and Snow Load Stress	Maximum Wind Load Stress	Maximum Stress	Section	Weight Per Foot of Length	Centre Line Length	Centre Line Weight	Corrected Maximum Stress	Corrected Section	Weight Per Foot of Length	Actual Length	Actual Weight of Member
B-1	+14.10	+3.65	+17.75	2L 3½x2½x⅜	14.4	10.69	153.9		2L 3½x2½x⅜	14.4	10.77	155.0
C-2	+14.10	+4.24	+18.34	"	"	"	153.9		"	"	10.69	153.9
X-1	-13.15	-3.92	-17.07	2L 3½x2½x5/16	12.2	10.00	122.0		2L 3½x2½x5/16	12.2	9.58	116.9
X-3	-8.72	-1.79	-10.51	"	"	"	122.0		"	"	10.00	122.0
1-2	+3.28	+1.55	+4.83	1L "	6.1	3.75	22.8		1L "	6.1	3.50	21.4
2-3	-5.57	-2.50	-8.07	1L "	"	12.50	76.4		1L "	"	11.50	70.1
3-3'	0.00	0.00	0.00	1L "	"	7.50	45.8		1L "	"	6.83	41.6
Totals							696.8					680.9

Centre Line Weight of Truss	1393.6	Weight of Truss and Roof	10367
Total Weight of Details	239.7	Detail Per Cent of Truss	17.61
Corrected Weight of Truss	1361.8	Weight Per Square Foot	roof 12.96
Corrected Actual Weight	1601.5	Horizontal Projection	truss 2.00

SPAN 100'-0" RISE 18'-9" DISTANCE BETWEEN TRUSSES 20'-0" DISTANCE BETWEEN SUPPORTS 80'-0"

Member	Permanent and Snow Load Stress	Maximum Wind Load Stress	Maximum Stress	Section	Weight Per Foot of Length	Centre Line Length	Centre Line Weight	Corrected Maximum Stress	Corrected Section	Weight Per Foot of Length	Actual Length	Actual Weight of Member
B-1	-5.46	-1.83	-7.29	2L's 3½ x 2½ x 5/16	12.2	10.69	130.2	-7.10	2L's 3½ x 2½ x 5/16	12.2	10.94	133.7
C-2	-5.46	-1.28	-6.74	"	"	"	130.2	-6.55	"	"	9.61	117.2
D-A	+15.00	+3.48	+18.48	2L's 3½ x 3 x 7/16	18.2	"	194.2	+17.68	2L's 3½ x 2½ x 7/16	16.6	10.61	193.0
E-6	+18.56	+3.96	+22.52	"	"	"	194.2	+21.54	"	"	10.69	194.0
F-8	+17.72	+3.37	+21.09	"	"	"	194.2	+20.17	"	"	10.69	194.0
X-1	+4.90	+1.91	+6.81	2L's 3½ x 2½ x 5/16	12.2	10.00	122.0	+6.55	2L's 3½ x 2½ x 5/16	12.2	9.50	115.9
X-3	-13.96	-3.68	-17.64	2L's "	"	"	122.0	-16.90	"	"	9.58	116.9
X-5	-17.37	-3.68	-21.05	"	"	"	122.0	-20.13	"	"	10.00	122.0
X-7	-16.53	-2.63	-19.16	"	"	"	122.0	-18.36	"	"	10.00	122.0
X-9	-14.24	-1.17	-15.41	"	"	"	122.0	-14.67	"	"	10.00	122.0
1-2	+3.57	+1.59	+5.16	1L 3½ x 2½ x 5/16	6.1	3.75	22.8	+4.97	1L 3½ x 2½ x 5/16	6.1	3.42	20.8
2-3	+23.83	+4.45	+28.28	2L's 3½ x 3 x ½	20.4	12.50	254.8	+27.05	2L's 3½ x 2½ x 9/16	20.8	12.75	265.3
3-A	-3.64	-0.00	-3.64	1L 3½ x 2½ x 5/16	6.1	7.50	45.8	-3.45	1L 3½ x 2½ x 5/16	6.1	7.08	43.1
4-5	+4.96	+0.00	+4.96	2L's "	12.2	15.00	183.0	+4.70	2L's "	12.2	14.08	171.9
5-6	+1.03	+1.51	+2.54	1L "	6.1	11.25	68.6	+2.48	1L "	6.1	10.92	66.6
6-7	-1.37	-1.85	-3.22	1L "	6.1	18.00	109.8	-3.16	1L "	"	17.08	104.1
7-8	+4.42	+2.64	+7.06	2L's "	12.2	15.00	183.0	+6.93	2L's "	12.2	14.67	179.0
8-9	-5.04	-3.04	-8.08	1L "	6.1	22.10	134.8	-7.79	1L "	6.1	21.18	129.0
9-9'	0.00	0.00	-0.00	1L "	6.1	18.75	114.2	0.00	1L "	"	18.08	110.1
Totals							2569.8					2520.6

Centre Line Weight of Truss	5139.6	Weight of Truss and Roof	27600.1
Total Weight of Details	698.3	Detail Per Cent of Truss	13.87
Corrected Weight of Truss	5041.2	Weight Per Square Foot	roof 13.80
Corrected Actual Weight	5739.5	Horizontal Projection	truss 2.87

SPAN 100'-0" RISE 18'-9" DISTANCE BETWEEN TRUSSES 20'-0" DISTANCE BETWEEN SUPPORTS 60'-0"

Member	Permanent and Snow Load Stress	Maximum Wind Load Stress	Maximum Stress	Section	Weight Per Foot of Length	Centre Line Length	Centre Line Weight	Corrected Maximum Stress	Corrected Section	Weight Per Foot of Length	Actual Length	Actual Weight of Member
B-1	-4.63	-1.83	-6.46	2 L's 3½ x 2½ x 5/16	12.2	10.69	130.2	-6.43	2 L's 3½ x 2½ x 5/16	12.2	10.86	132.5
C-2	-4.63	-1.28	-5.71	"	"	"	130.2	-5.68	"	"	10.69	130.2
D-A	-9.50	-3.07	-12.57	"	"	"	130.2	-12.51	"	"	10.02	122.2
E-6	+1.65	+0.74	+2.39	"	"	"	130.2	+2.38	"	"	10.61	129.8
F-8	+4.73	+1.86	+6.59	"	"	"	130.2	+6.56	"	"	10.69	130.2
X-1	+4.39	+1.91	+6.30	"	"	10.00	122.0	+6.27	"	"	9.65	117.8
X-3	+8.95	+4.16	+13.11	"	"	"	122.0	+13.06	"	"	9.80	119.7
X-5	-1.49	-1.05	-2.54	"	"	"	122.0	-2.53	"	"	9.67	118.0
X-7	-4.50	-1.59	-6.09	"	"	"	122.0	-6.06	"	"	10.00	122.0
X-9	-4.50	-1.05	-5.55	"	"	"	122.0	-5.52	"	"	10.00	122.0
1-2	+3.38	+1.59	+4.97	1 L "	6.1	3.75	22.8	+4.95	1 L "	6.1	3.42	20.8
2-3	-5.71	-2.60	-8.31	1 L "	"	12.50	76.4	-8.29	1 L "	"	11.42	71.0
3-4	+5.10	+2.35	+7.45	1 L "	"	7.50	45.8	+7.43	1 L "	"	7.00	42.7
4-5	+15.78	+4.54	+20.32	2 L's 3½ x 2½ x 11/16	23.0	15.00	345.0	+20.23	2 L's 3½ x 2½ x 9/16	20.8	15.08	313.8
5-6	-4.66	-0.73	-5.39	1 L 3½ x 2½ x 5/16	6.1	11.25	68.6	-5.36	1 L 3½ x 2½ x 5/16	6.1	10.42	63.5
6-7	+5.40	+0.89	+6.29	2 L's 3½ x 2½ x 3/8	14.4	18.00	259.5	+6.25	2 L's 3½ x 2½ x 9/16	12.2	17.33	211.7
7-8	0.00	+1.10	+1.10	2 L 3½ x 2½ x 5/16	12.2	15.00	183.0	+1.09	"	"	14.42	176.0
8-9	0.00	-1.20	-1.20	1 L "	6.1	22.10	134.8	-1.19	1 L 3½ x 2½ x 5/16	6.1	21.52	131.1
9-9'	0.00	0.00	0.00	"	"	18.75	114.2	0.00	"	6.1	18.00	109.9
Totals							2511.1					2384.9

Centre Line Weight of Truss	5022.2	Weight of Truss and Roof	27265.6
Total Weight of Details	615.2	Detail Per Cent of Truss	12.85
Corrected Weight of Truss	4789.8	Weight Per Square Foot	roof 13.63
Corrected Actual Weight	5405.0	Horizontal Projection	truss 2.70

SPAN 100'-0" RISE 18'-9" DISTANCE BETWEEN TRUSSES 20'-0" DISTANCE BETWEEN SUPPORTS 40'-0"

Member	Permanent and Snow Load Stress	Maximum Wind Load Stress	Maximum Stress	Section	Weight Per Foot of Length	Centre Line Length	Centre Line Weight	Corrected Maximum Stress	Corrected Section	Weight Per Foot of Length	Actual Length	Actual Weight of Member
B-1	-5.06	-1.83	-6.89	2L 3½x2½x5/16	12.2	10.69	130.2	-6.91	2L 3½x2½x5/16	12.2	10.86	132.4
C-2	-5.06	-1.28	-6.34	"	"	"	130.2	-6.36	"	"	10.69	130.2
D-4	-9.68	-3.07	-12.75	"	"	"	130.2	-12.78	"	"	"	130.2
E-6	-14.39	-4.80	-19.19	"	"	"	130.2	-19.23	"	"	"	130.2
F-8	-7.30	-1.48	-8.78	"	"	"	130.2	-8.80	"	"	"	130.2
X-1	+4.76	+1.86	+6.62	2L 3½x2½x⅜	14.4	10.00	144.0	+6.63	2L 3½x2½x⅜	14.4	9.58	137.9
X-3	+9.08	+4.16	+13.24	"	"	"	144.0	+13.26	"	"	10.00	144.0
X-5	+13.44	+6.30	+19.74	"	"	"	144.0	+19.78	"	"	"	144.0
X-7	+6.85	+1.08	+7.93	2L 3½x2½x5/16	12.2	"	122.0	+7.95	2L 3½x2½x5/16	12.2	"	122.0
X-9	+4.64	+0.34	+4.98	"	"	"	122.0	+4.99	"	"	"	122.0
1-2	+3.36	+1.59	+4.95	L "	6.1	3.75	22.8	+4.96	L "	6.1	3.42	20.8
2-3	-5.55	-2.60	-8.15	"	"	12.50	76.4	-8.16	"	"	11.50	70.1
3-4	+5.00	+2.34	+7.34	"	"	7.50	45.8	+7.35	"	"	7.08	43.1
4-5	-6.72	-3.18	-9.90	"	"	15.00	91.5	-9.92	"	"	14.25	86.9
5-6	+6.65	+4.56	+11.21	2L "	12.2	11.25	137.2	+11.23	2L "	12.2	10.58	129.0
6-7	+12.12	+4.67	+16.79	2L 5x3½x⅜	20.8	18.00	374.5	+16.82	2L 5x3½x5/16	17.4	17.33	301.9
7-8	-4.24	-1.35	-5.59	L 3½x2½x5/16	6.1	15.00	91.5	-5.60	L 3½x2½x5/16	6.1	13.83	84.4
8-9	+4.74	+1.58	+6.32	2L 5x3½x5/16	17.4	22.10	384.4	+6.33	2L 3½x3x5/16	13.2	21.43	282.8
9-9'	0.00	0.00	0.00	L 3½x2½x5/16	6.1	18.75	114.2	0.00	L 3½x2½x5/16	6.1	17.87	108.9
Totals							2665.3					2451.0

Centre Line Weight of Truss	5330.6	Weight of Truss and Roof	27460.9
Total Weight of Details	698.3	Detail Per Cent of Truss	14.20
Corrected Weight of Truss	4902.0	Weight Per Square Foot	roof 13.73
Corrected Actual Weight	5600.3	Horizontal Projection	truss 2.80

SPAN 100'-0" RISE 18'-9" DISTANCE BETWEEN TRUSSES 20'-0" DISTANCE BETWEEN SUPPORTS 20'-0"

Member	Permanent and Snow Load Stress	Maximum Wind Load Stress	Maximum Stress	Section	Weight Per Foot of Length	Centre Line Length	Centre Line Weight	Corrected Maximum Stress	Corrected Section	Weight Per Foot of Length	Actual Length	Actual Weight of Member
B-1	-5.06	-1.88	-6.94	2L 3½x2½x5/16	12.2	10.69	130.2	-6.84	2L 3½x2½x5/16	12.2	10.85	132.2
C-2	-5.06	-1.31	-6.37	"	"	"	130.2	-6.27	"	"	10.69	130.2
D-4	-9.69	-2.92	-12.71	"	"	"	130.2	-12.52	"	"	"	130.2
E-6	-14.59	-4.54	-19.13	"	"	"	130.2	-18.84	"	"	"	130.2
F-8	-19.65	-6.25	-25.90	2L 3½x2½x3/8	14.4	"	153.9	-25.51	2L 3½x2½x3/8	14.4	"	153.9
X-1	+4.70	+2.01	+6.71	2L 3½x2½x½	18.8	10.00	188.0	+6.62	2L 3½x2½x½	18.8	9.58	180.0
X-3	+9.12	+4.03	+13.15	"	"	"	188.0	+12.97	"	"	10.00	188.0
X-5	+13.70	+6.13	+19.83	"	"	"	188.0	+19.55	"	"	"	188.0
X-7	+18.38	+8.19	+26.57	"	"	"	188.0	+26.19	"	"	"	188.0
X-9	+13.80	+0.73	+14.53	2L 3½x2½x5/16	12.2	"	122.0	+14.25	2L 3½x2½x5/16	12.2	"	122.0
1-2	+3.45	+1.55	+5.00	1L "	6.1	3.75	22.8	+4.93	1L "	6.1	3.42	20.8
2-3	-5.55	-2.54	-8.09	1L "	6.1	12.50	76.4	-7.98	1L "	"	11.42	75.9
3-4	+5.21	+2.34	+7.55	1L "	6.1	7.50	45.8	+7.45	1L "	"	7.17	43.7
4-5	-6.96	-3.12	-10.08	1L "	6.1	15.00	91.5	-9.95	1L "	"	14.25	87.0
5-6	+6.90	+3.15	+10.05	2L "	12.2	11.25	137.1	+9.92	2L "	12.2	10.92	133.3
6-7	-8.39	-3.78	-12.17	1L 3½x2½x3/8	7.2	18.00	129.6	-11.99	1L 3½x2½x3/8	7.2	17.25	124.1
7-8	+8.59	+3.93	+12.52	2L "	14.4	15.00	216.0	+12.34	2L "	14.4	14.42	208.0
8-9	+9.70	+7.30	+17.00	2L 5x3½x½	27.2	22.10	600.1	+16.80	2L 5x3½x7/16	24.0	20.93	502.0
9-9'	0.00	0.00	0.00	1L 3½x2½x5/16	6.1	18.75	114.1	0.00	1L 3½x2½x5/16	6.1	17.92	109.3
Totals							2982.1					2846.8

Centre Line Weight of Truss	5964.2	Weight of Truss and Roof	28397.8
Total Weight of Details	843.6	Detail Per Cent of Truss	14.80
Corrected Weight of Truss	5693.6	Weight Per Square Foot	roof 14.20
Corrected Actual Weight	6537.2	Horizontal Projection	truss 3.27

Sheet #1.

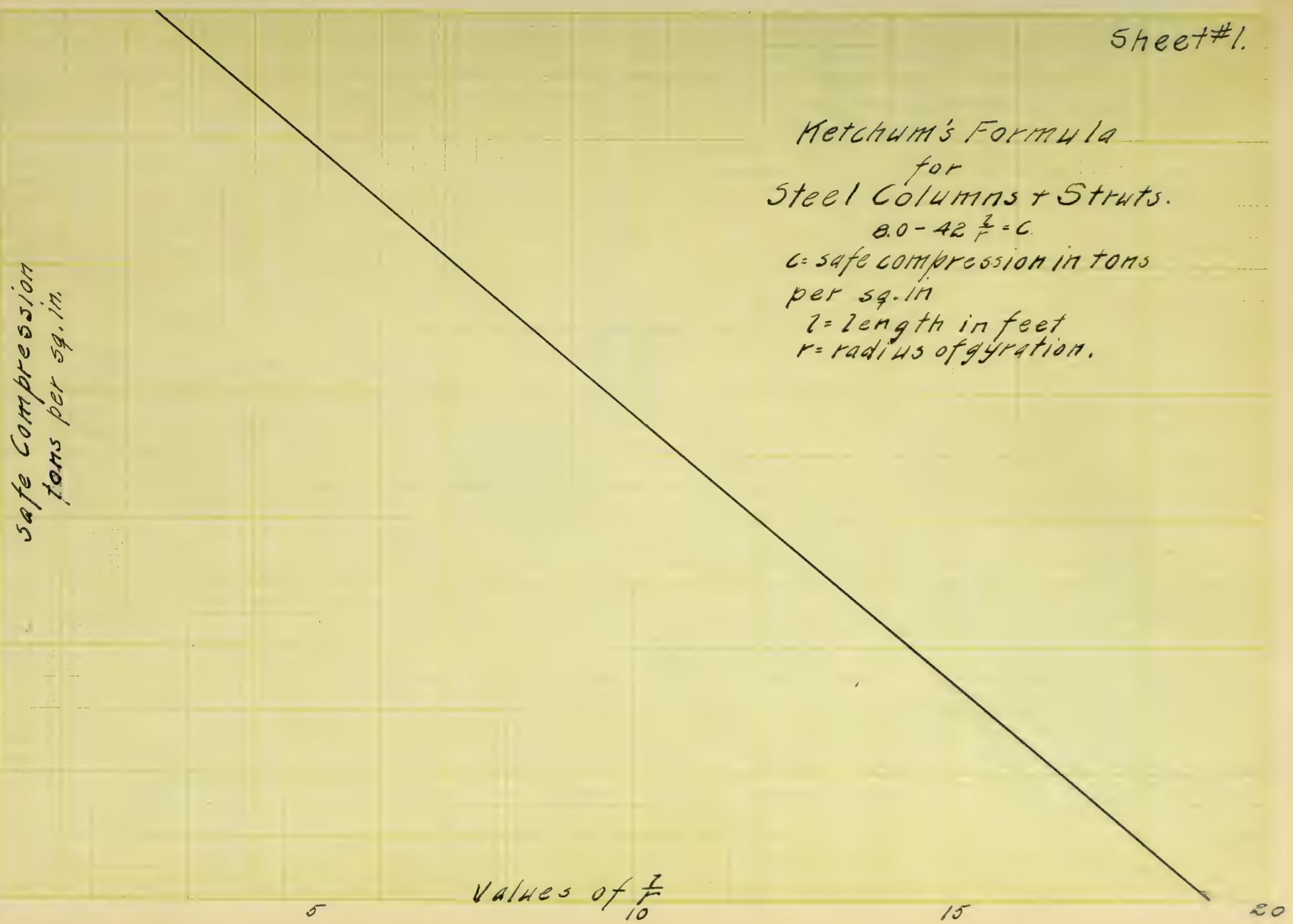
Ketchum's Formula for Steel Columns + Struts.

$$8.0 - 42\frac{l}{r} = C$$

C = safe compression in tons per sq. in

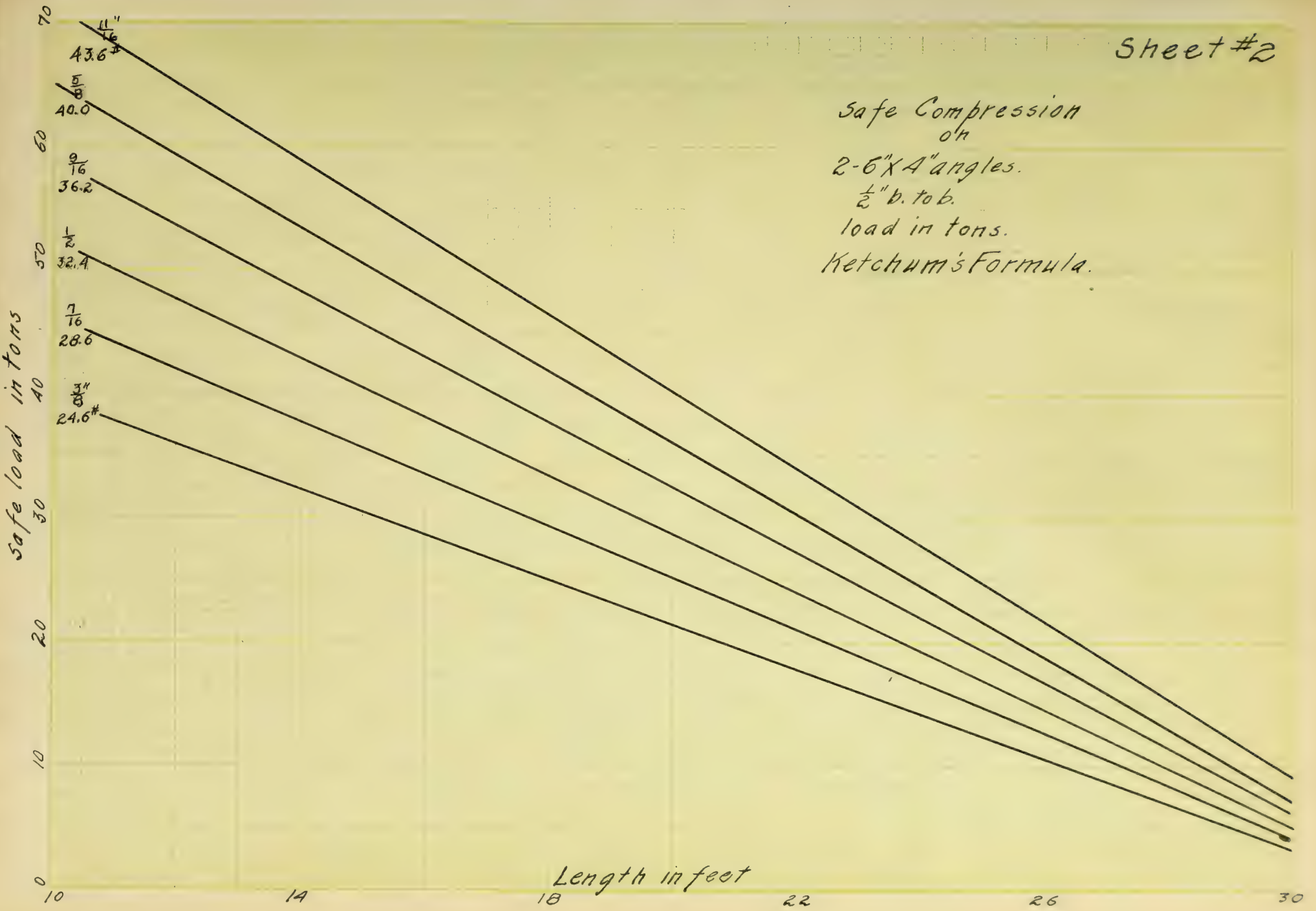
l = length in feet

r = radius of gyration.



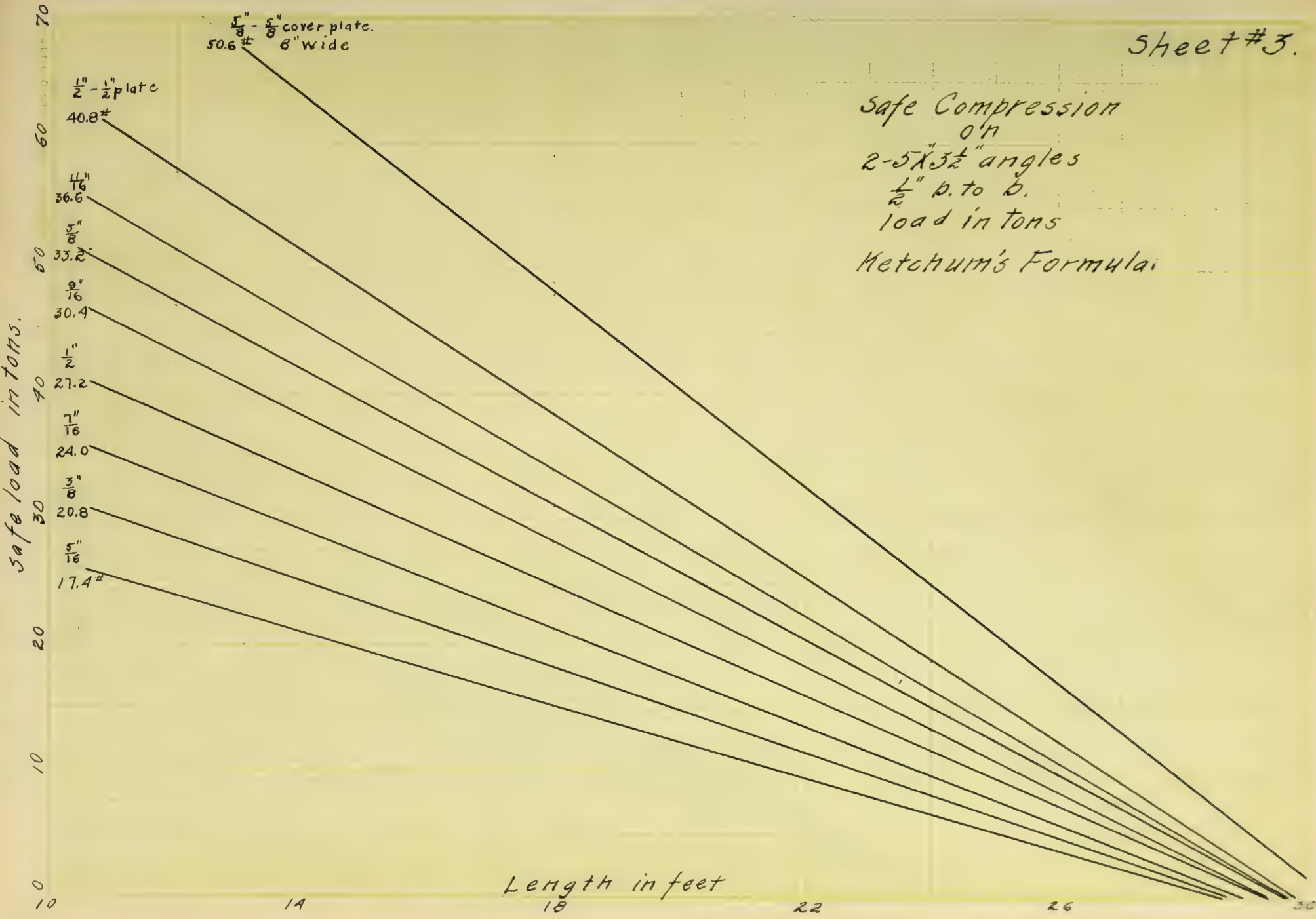
Sheet #2

Safe Compression
on
2-6"X4"angles.
½" b. to b.
load in tons.
Ketchum's Formula.



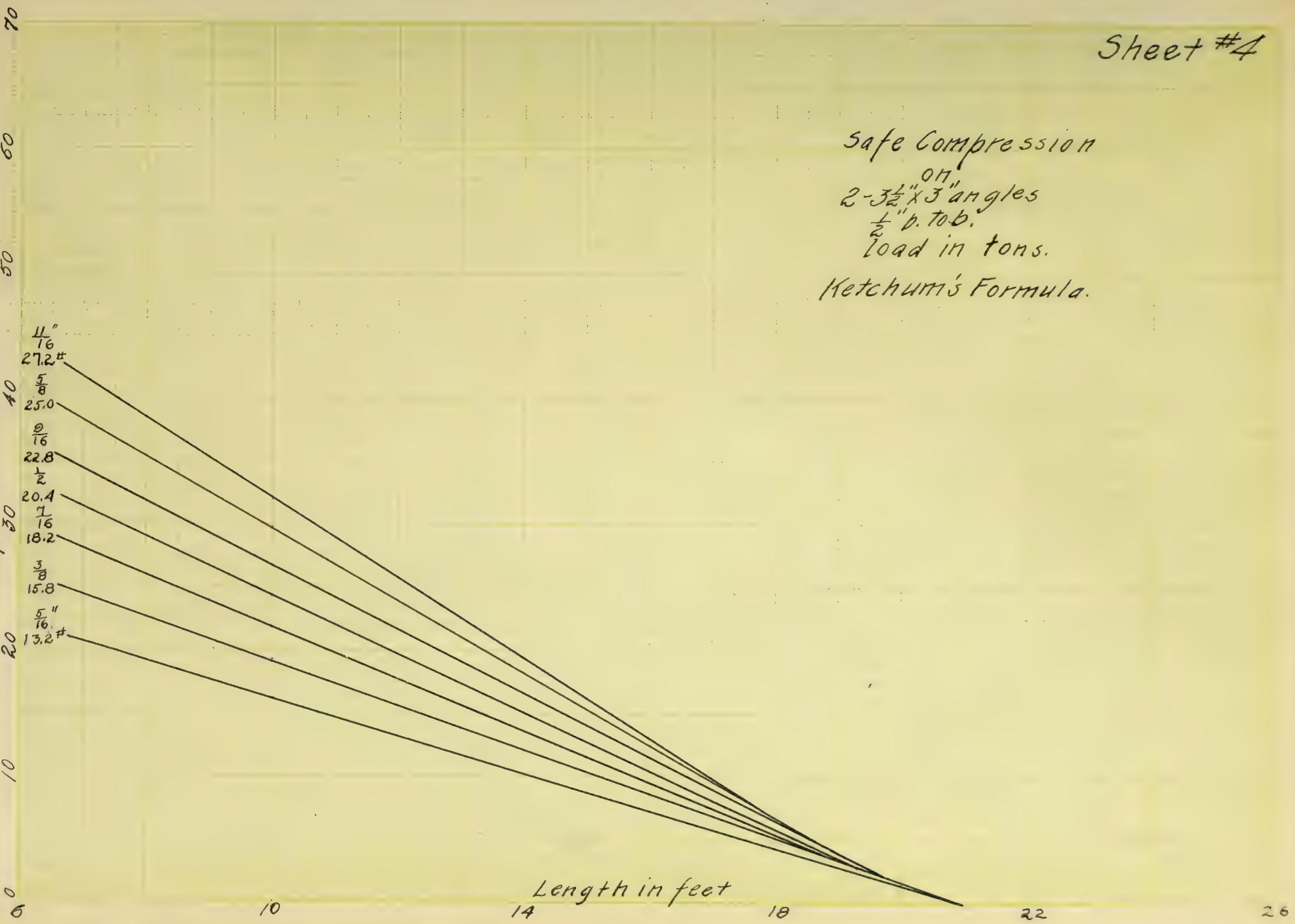
Sheet #3.

Safe Compression
on
2-5"x3½" angles
½" p. to p.
load in tons
Ketchum's Formula.



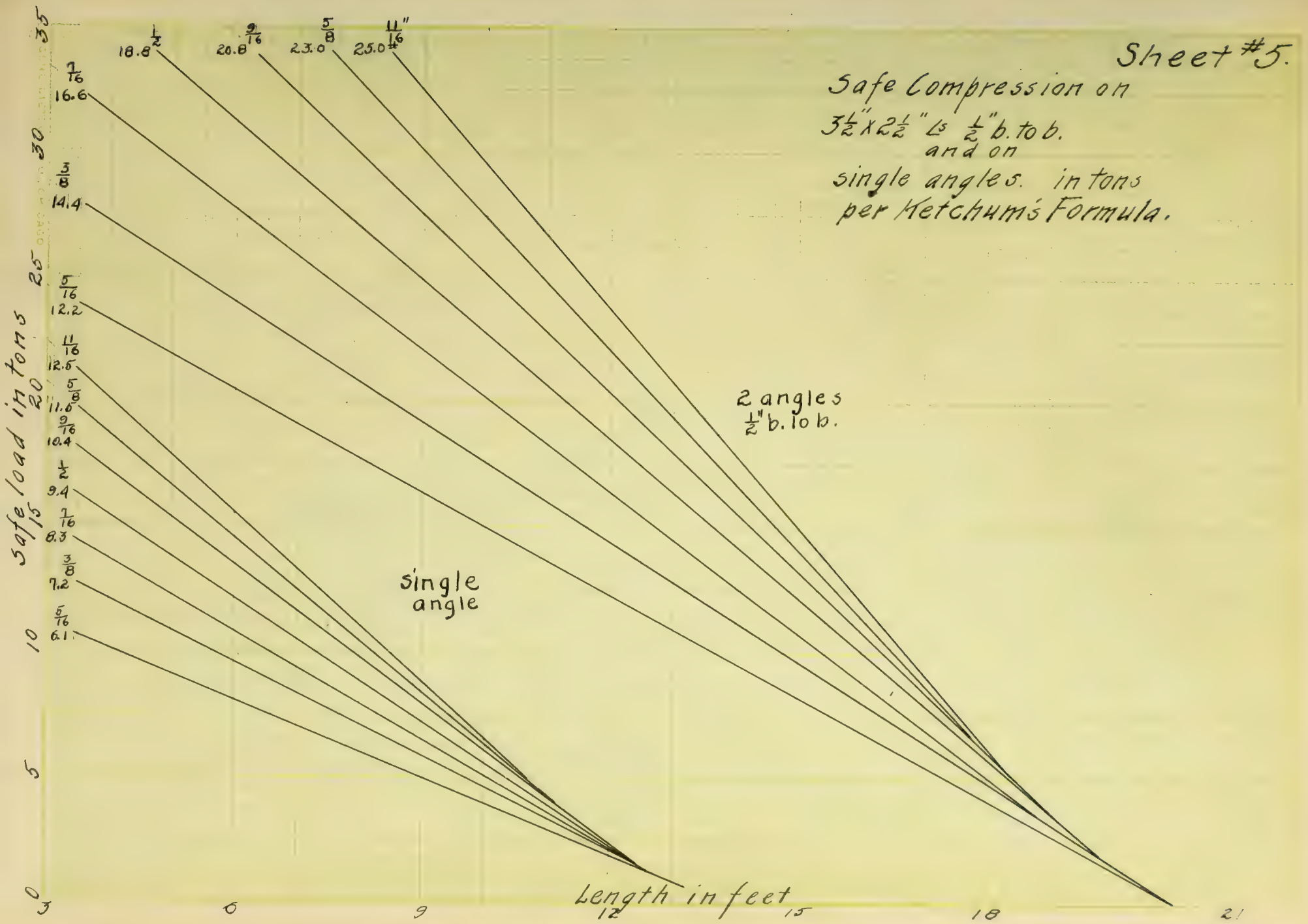
Sheet #4

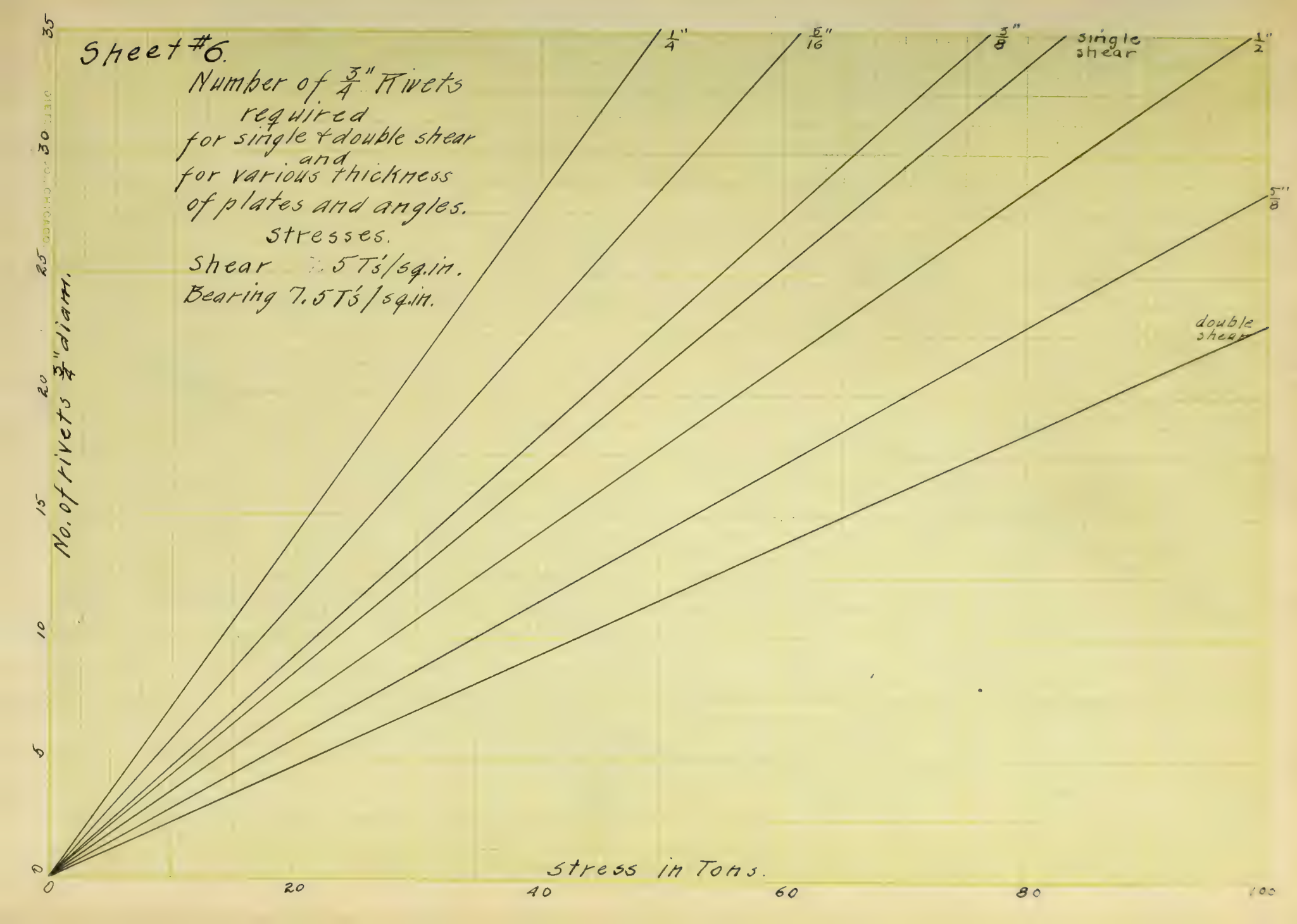
Safe Compression
on
2-3½"x3" angles
½" b. to b.
load in tons.
Ketchum's Formula.



Sheet #5.

Safe Compression on
$3\frac{1}{2}$"x$2\frac{1}{2}$" Ls $\frac{1}{2}$" b. to b.
and on
single angles. in tons
per Ketchum's Formula.




Sheet #6.
Number of 3/4" Rivets required for single & double shear and for various thickness of plates and angles.
Stresses.
Shear 7.5 Ts/sq.in.
Bearing 7.5 Ts/sq.in.
1/4"
5/16"
3/8"
single shear
1/2"
5/8"
double shear
No. of rivets 3/4" diam.
Stress in Tons.
0
5
10
15
20
25
30
35
0
20
40
60
80
100

Comparison of Weight of Truss in pounds per sq. ft. horizontal surface.

Black line - trusses with span shown.
Red line - 160' truss supported at different points shown.
Green line - 100' truss supported at different points shown

Weights of Trusses

in pounds per square foot of horizontal area covered. As given by various formula. and from the results of the study of trusses.

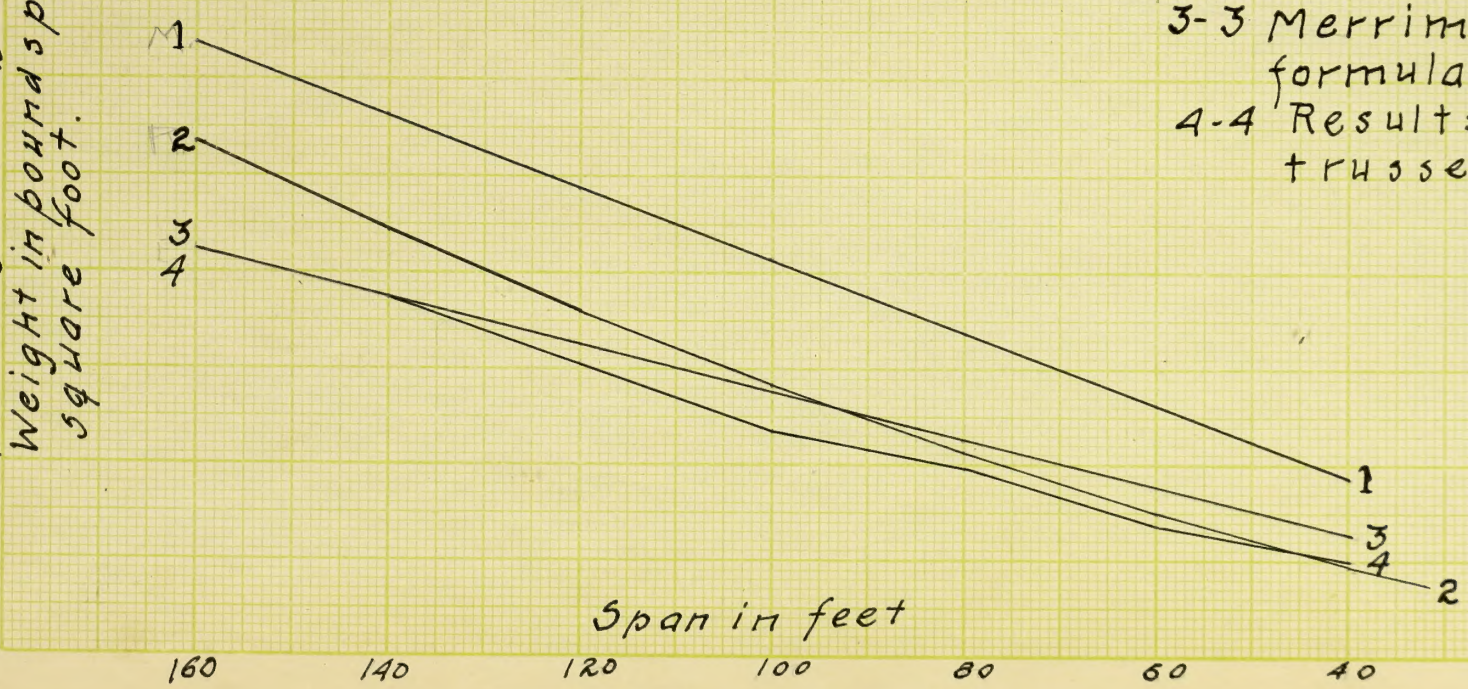
Curves.

1-1 Merrimans and Jacoby's formula for steel trusses.

2-2 Ricker's formula for wood and steel trusses.

3-3 Merrimans and Jacoby's formula for wood trusses

4-4 Results of the study of trusses.



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